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Greater Profit Per Unit Industry's *Need*

Selling cars on too slim a margin is reacting to detriment of automobile factories, parts makers and dealers.

By Julian Chase

Directing Editor, Chilton Class Journal Publications

WE can frame in a few questions the fundamentally important part of what many students of the industry are thinking about in these days that are upon us.

How can the operation of the law of diminishing returns be checked in those widespread places where it is now all too evidently at work?

Are there influences in the industry which are powerful enough and persistent enough to overcome those other influences which are responsible for the policy—long prevalent but now, happily, not so popular—of turn them out, price them low and make them take them?

Will remedial measures which might be applied and are being applied with no particular plan or system so far as the industry as a whole is concerned, act with sufficient rapidity and thoroughness to clear up present and prevent future congestion in the distribution channels without a deliberate, and to some perhaps a disastrous, curtailment of production?

Must we not strive for greater unit profits for car manufacturer, parts and accessory maker, wholesaler and dealer, as much as a means of getting rid of what is the matter with us as because it is a most desirable end in itself?

When we come to talk of the ills of the industry nowadays it is not wholly safe to use broad, sweeping statements generally applied. We have to keep in mind those encouraging indications which are apparently growing out of the practices of some of our most successful companies, such practices, for example, as regulating production according to sales, maintaining high unit profits, selling on quality appeal rather than one price alone, and constructively endeavoring to alter the psychology of the used car situation from the public's point of view. We have our ills and they are real and fundamental, but the contribution of causes is not so nearly universal as it was. It is becoming more definitely localized and is, therefore, making more conspicuous those who do the contributing—who are also those who most directly suffer from the ills and most actively inflict that suffering on others.

Today when one thinks of high pressure production and low pressure profits; of forced sales on overstocked dealers; of using decreased price rather than increased quality as an unvarying sales appeal, one thinks not so much of the industry as a whole as of those companies in the industry which have more or less regularly and persistently gone in for such things. And the largest of all single and independent manufacturers is by no means the only one.

We have our ills and the outstanding symptom of the greatest one is our apparent craving for volume which at times has seemed to overshadow and impair our appetite for profit. It is but saying it again to state that our chief pride has been in our bigness. The outstripping of a competitor has been too much a matter of exceeding his output. There has apparently been—or at least so some say—too little satisfaction in coming out ahead in the place where the money is counted. This seems too absurd to be true and yet we have before us the fact that in the case of all but one or two companies, unit profits have steadily decreased and in the case of some of them the point of diminishing returns has already been reached.

What, besides the desire to make cars instead of money, has been responsible for congestion and stagnation in our distribution system, the breaking of dealers on the wheel of ceaseless output, a condition of imminent bankruptcy for a percentage of our dealers

which is so large that it can be characterized as staggering? What besides the struggle for volume and domination by the number of units turned out has been responsible for the constant beating down of parts makers to the point of dangerously low or disappearing profits, or failure or withdrawal from the field?

The fact that the dealers, forgetting now the Pences, the Donovans, the Fullers and the others of that small band of exceptionals who have the "houses on the hills," the fact that the general run of dealers who are counted by the thousands instead of by the tens, have not developed fully their market possibilities, does not relieve the manufacturers of the responsibility for the present state of things on the outer edge of the distribution circle.

The Dealer's Limitations

The dealer was what he has been and is what he is just as much as the Panama Canal is what it is, and just so much and no more could be got through him with the methods that were used.

The dealer has not traded wisely. He has cut new car prices and given away his profits by over-allowance on used cars. He has paid, with suicidal generosity, too large a part of the cost of the public's motoring by his absorption of used car losses. He has not rung door bells wisely if he has really rung any. He has barely whispered his "Ask 'em to buy" and much less gone out and sold. But—

The dealer, what he was and is, just as he was and is, has been one of the limiting factors of this business and as such has deserved more than he has got from the manufacturer in the way of consideration, not as a man, but merely as an outlet pipe which has a determinable diameter and so many turns and bends and obstructions in it. Try to get through a pipe more than it will carry and you get a back-up. Would not the acceptance of this fact, in place of the hope that it might be otherwise, have been a part of wisdom?

The president of an important passenger car company said the other day: "When you build too many of any product you finally have to slow down no matter what artificial means of stimulating business you may use. We automobile manufacturers have demonstrated that at various times in the past; we demonstrated it again the last month or so of 1926. Business at the present time looks pretty good, but all the used car plans, retail financing plans or anything else in the world won't enable us to keep production up if we build more than the dealers can sell. There's no use trying to fool yourself about that." The company which this man heads is in the big production class as middle-priced cars go.

Henry Ford stands as the chief exponent of quantity production and all that goes with it. When he needs more sales he reduces prices—or so he has done up to this time. Ford's production in 1926 was less than in 1925. Ford's chief competitor's production in 1926 showed a striking gain. Ford's prices are lower than those of his chief competitor. These things are well known. They are hopefully significant because they show, as demonstrated again by actual accomplishment, that price is not the ruling factor in the sale of cars. They show that unit profits can be maintained without the loss in volume which would impair the net on the capital investment. They show this much at the very least and it doesn't take much optimism or imagination to make it seem likely that they show a lot more.

In the record-breaking attendance at the shows which have so far been held is to be found another bit of evidence that price in these days of part-payment plans —and there are those who believe it was always so—is not the enticing bait that some have thought it. It must be that other things will draw in prospective buyers, for nothing has been said in pre-show publicity, either direct or indirect, about cheaper cars.

If we can be less concerned about price we can be more concerned about unit profits. And if we get higher unit profits we can worry less about maximum output. Even those fellows who now feel and perhaps know only too well that they must, with the present prices, keep their plants at capacity to keep them open, could meet their overhead and possibly find a dividend or two with slightly reduced production if they could get a slightly higher profit on each unit. And if it were found that we could hold our net on a reduced production with higher unit profit wouldn't that be good for everybody from one end of the industry to the other?

New Car Stocks

New car stocks in the hands of dealers on Jan. 1 have been estimated at more than 575,000. Some say this estimate is too high. It may be so, but whatever the actual was, it would have been more satisfactory if it had been less. Reports on used car stocks are a bit contradictory when taken from here and there, but whether stocks are somewhat greater or somewhat less than a year ago is of less consequence than the fact that they always are too high and this year, whatever their numbers, their value has been seriously reduced by those necessary stimulants to new car sales, the new and better models.

Is it merely wild imagining to speculate on what the condition of the industry would have been today if prices had been somewhat higher, unit profits somewhat greater, production somewhat less in 1926? Would not the used car have been so much less of a problem? Would not new car stocks have been more nearly in accord with demand? Would not the sales depression of the period just passed have been less acute? Would not the motor marketplace have been in better shape? You can drive a truck through congested traffic but you use less gas, burn up less brake lining and make better time if road is clear.

Let us say now that none of this is to be interpreted as a plea for higher prices. The industry has been justly proud of the fact, and has undoubtedly profited greatly by it, that the automobile

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THE whole question of greater unit profits, the desirability and possibility of getting them, will be discussed from all points of view by publications of the Chilton Class Journal Co. during the next few months, each in its well defined field.

Automotive Industries **will give special emphasis to the problems of the car and parts makers in this connection.** ***Motor World Wholesale*** **will consider the case of the jobbers and distributors.** ***Automobile Trade Journal*** **and** ***Motor Age*** **will go into the possibilities that lie before the dealer.** ***Commercial Car Journal*** **will devote its attention to what can be done among and by the men who make and sell trucks.**

How the Stroke-Bore Ratio Affects Engine Operation

Power, thermal efficiency and smoothness all subject to change with the proportion of stroke to bore in engine design. Weight and salability also to be considered.

By P. M. Heldt

ONE of the problems that confront the automobile engineer every time a new engine is designed is that of the best proportion of stroke to bore. What is meant by "best" in this connection calls for some explanation. Whenever a change is made in the stroke-bore ratio several characteristics of the engine are affected. Included among these is the weight efficiency, that is, the weight of the complete engine per unit of maximum power output. Other factors that are subject to change with the stroke-bore ratio are the thermal efficiency (fuel economy) and the smoothness of operation or freedom from vibration. Under certain conditions the reliability of the engine in service and its useful life may also be affected, but it is evidently the most logical plan to so proportion the parts that the stresses in the various members and the unit pressures on all bearing surfaces remain the same, in which case there is no reason to expect any change in the life or in the degree of reliability. Evidently a weighing of the effects of a change in the stroke-bore ratio on all of these factors is necessary in order to determine what is the best ratio from what may be called the operating efficiency standpoint.

The Factor of Salability

Finally, one thing that must not be overlooked is the salability of the engine.

If—as is the case in England—the public demands engines of the smallest possible bore, because there is a high tax on the bore while there is none on the stroke, it may be advisable to use small bores and long strokes in spite of any advantages the reverse type may possess, because salability is necessarily a feature of dominant importance in any manufactured product.

Similarly, if the public demands engines with a large number of cylinders and at the same time wants the wheelbase kept short, for the sake of better maneuverability, then, too, it may be best to seek to obtain the required power by the use of long strokes rather than large bores, regardless of all other considerations.

The whole problem evidently is a very complicated one and cannot be solved algebraically once for all. But among the factors in it which need consideration are the effects of the stroke-bore ratio on the various operating characteristics, and these will be considered here.

In studying the effect of variations in the stroke-bore ratio it is advisable to consider engines of the same cylinder number and the same piston displacement per cylinder, so that the effect of displacement on the various criteria may be eliminated. Probably the only method of attack is by choosing two examples, which preferably should have widely different stroke-bore ratios, while all of those features which are not dependent upon this ratio should be the same.

A difficulty arises in connection with the choice of wall thicknesses. Evidently the walls of the cylinder should be made somewhat thicker with an increase in the bore if the stresses are to remain the same, and the walls of the crankcase should be increased in thickness with an increase in the length of stroke, but, as a matter of fact, within the limits of the bores and strokes used for passenger car engines the wall thickness for any particular part is always made the same, the lower limit being set by shop conditions.

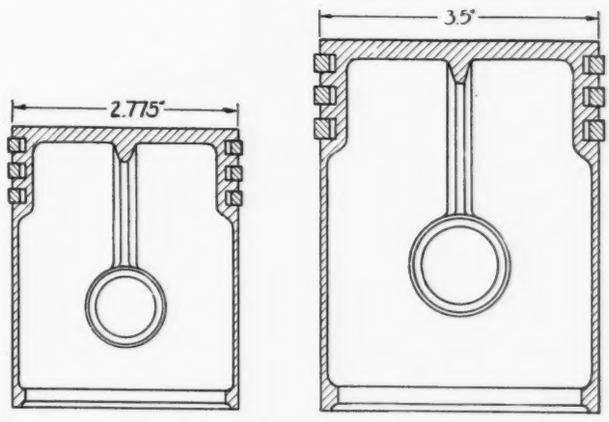


Fig. 1—Comparison of piston sizes for long and short stroke engines

To get an idea of the effect of changes in the stroke-bore ratio on the weight efficiency, we will assume two six-cylinder engines of the same displacement, one having a stroke-bore ratio of 1:1 and the other a ratio of 2:1. The first may have a stroke and bore of 3½ in.

each. Calling this a and the bore of the other engine, which is to have a stroke-bore ratio of 2, b, we have

$$a^3 = 2\,b^3,$$

from which it follows that

$$a = \sqrt[3]{2\,b} = 1.26\,b$$

Since $a = 3.5$, $b = 3.5/1.26 = 2.775$.

That is, the bore of the long stroke engine is 2.775 in. and its stroke is twice this or 5.55 in.

The first problem that arises is that of the relative weights of the reciprocating parts. Theoretically one would expect the weight of the piston to vary a little faster than the square of the bore and to be independent of the stroke. The piston comprises two principal parts, the head and the skirt. The area of the head varies as the square of the bore, and since the thickness of the head must increase somewhat with the bore, both to enable it to withstand the mechanical stresses and to conduct the heat absorbed sufficiently rapidly, it is obvious that the weight of the head varies more rapidly than the square of the bore. As regards the skirt, the circumference is directly proportional to the bore and the length usually is also made proportional thereto, hence, since the thickness should increase somewhat with the bore, the amount of metal in the skirt also would vary slightly faster than the square of the bore.

It occurred to the writer to determine the relation between the bore, stroke and weight of the piston (with rings and pin) from actual data. The weights of these parts of most of the stock passenger car engines listed in the 1927 Specification Tables of *Automotive Industries* were used and inserted in the following formula

$$W = c \times b^x\, l^y \text{ oz.}$$

where W is the weight of the parts mentioned, in ounces; c, a constant; b, the bore in inches; l, the stroke in inches, and x and y are exponents. This gave a series of "observation equations" from which the most accurate values of c, x and y were determined by the method of least squares. The result arrived at was

$$W = 0.197\, b^{2.31}\, l^{0.031}$$

This confirms the supposition made above that the weight of the piston and its associated parts is practically independent of the length of stroke, because the exponent of the stroke in the formula is exceedingly small. Practically the same result as from the above equation is obtained from the simpler one

$$W = 0.2\, b^{2.34}$$

Using this equation we get for the weight of the piston in the 3½ by 3½ in. cylinder

$$0.2\ X\ 3.5^{2.34} = 37.5 \text{ oz.}$$

and for the weight of the piston in the 2.78 by 5.55 in. cylinder

$$0.2\ X\ 2.78^{2.34} = 21.6 \text{ oz.}$$

It is more difficult to deal with the weight of the connecting rod as a function of the bore and stroke. The rod consists essentially of three parts, viz., the upper boss, the shank and the big end. The weight of the upper boss evidently depends upon the bore only and varies substantially as the square of the bore. The cross-section of the shank should vary as the square of the bore and also slightly with the length, because of the increasing "bowing" tendency with increase in length. The length of the shank varies directly as the stroke. Finally we have the big end, which is the most difficult to deal with of all. The weight of this end evidently must depend to a certain extent upon the crankpin diameter and before discussing it further it will be well to settle the question of crankshaft diameters.

Since the total gas pressures on the piston head are much smaller in the long stroke, small bore engine, it might be thought that the crankshaft for this engine could be made lighter. However, in high speed engines the crankshaft diameters are determined chiefly with respect to their resistance to torsional vibration. Now, the torque moment impressed on the crankshaft is the same in the two cases, for the smaller total gas pressure on the piston head of the long stroke engine is compensated for by the greater length of the lever arm through which it acts. Hence it would seem logical to make both crankshafts of the same diameter. Of course, the crankshaft for the long stroke engine will be somewhat shorter in overall length. This tends to make it stiffer, but, on the other hand, the greater length of its crank arms tends to make it more flexible torsionally, and, therefore, with the same diameters of all journals in both engines the resistance to torsional vibration should be substantially the same.

Connecting rods for two engines designed in accordance with present-day practice are shown in Fig. 2. The crankpins in both cases are 2 in. in diameter and the center-to-center length of the connecting rod is made 2¼ times the length of stroke. Calculating the weights of the different elements of the connecting rod (disregarding the weights of fillets, bolt lugs, bolts and nuts), we arrive at the following values:

	Short Stroke Engine	Long Stroke Engine
Upper Hub	8.1 oz.	5.1 oz.
Shank	7.2 oz.	11.2 oz.
Big End	18.7 oz.	16.0 oz.
Total	34 oz.	32.3 oz.

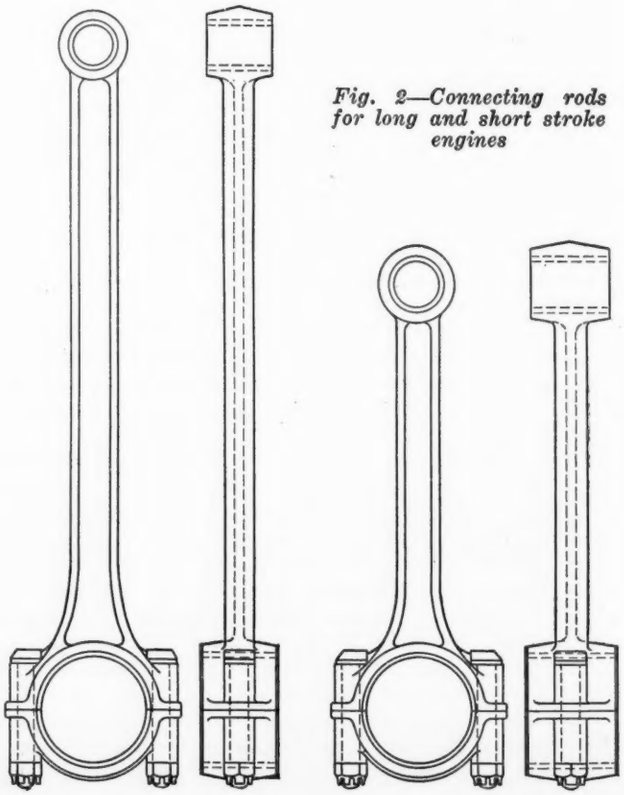


Fig. 2—Connecting rods for long and short stroke engines

The various parts neglected would add several ounces to these weights, but substantially the same amounts in both cases.

It is evidently logical to consider the weight of the upper hub and one-half the weight of the shank as reciprocating and the rest as rotating weight. Hence, in the case of the short-stroke engine the reciprocating portion of the connecting rod weight is 11.7 oz. and the rotating portion, 22.3 oz. Similarly, in the case of the long-stroke engine the reciprocating part of the connecting rod weight is 10.7 oz. and the rotating portion, 21.6 oz.

The total reciprocating weights per cylinder in the two engines therefore are

	Short Stroke	Long Stroke
Piston, etc.	37.5 oz.	21.6 oz.
Connecting Rod	11.7 oz.	10.7 oz.
Total	49.2 oz.	32.3 oz.

The inertia forces are proportional to these reciprocating weights and also to the lengths of stroke. They are also proportional to the square of the speed of revolution, but for the present we will consider both engines to operate at the same number of r.p.m. Since both have the same displacement they will then be developing the same power.

It may be well here to digress for a moment from the case of the six-cylinder to investigate the effect of changes in the stroke-bore ratio on the vibrating forces in a four-cylinder engine. Since we have assumed the ratio of connecting rod length to length of stroke the same in both engines, the angularity of the connecting rods is the same in both, and the maximum vibrating forces at the same rotary speeds will depend solely on the weight of the reciprocating parts and on the lengths of stroke. We then have

Short Stroke	Long Stroke
$3.5 \times 49.2 = 172$	$5.55 \times 32.3 = 179$

Hence the vibrating forces in a four-cylinder engine are about 4 per cent greater if the engine has a stroke equal to twice the bore than if it has a stroke equal to the bore.

The inertia and centrifugal forces are also largely responsible for the loads on the various bearings of the crank train. Let us take the piston pin bearings, which carry only the inertia load due to the weight of the piston with its rings and the piston pin. These inertia loads are

$37.5 \times 3.5 = 131.5$ for the short stroke, and

$21.6 \times 5.55 = 120$ for the long stroke engine.

Thus the load on the piston pins is smaller in the long stroke engine. However, the piston pin of the short stroke engine has a bearing surface of

$$\tfrac{7}{8} \times 1\tfrac{5}{8} = 1.42 \text{ sq. in.},$$

while that of the long stroke engine is only

$$\tfrac{3}{4} \times 1\tfrac{1}{4} = 0.94 \text{ sq. in.}$$

Hence the unit bearing load on the piston pin is considerably greater in the case of the long stroke engine, in the ratio of—

$$(120/0.94)/(131.5/1.42) = 1.38$$

In other words, the specific load on the piston pin bearings will be 38 per cent greater in the case of the long stroke than in that of the short stroke engine.

The unit loads due to the gas pressure will be the same in both cases, as both the total gas pressures and the bearing areas are proportional to the square of the bore. It is, however, the inertia loads which increase with the speed and which, therefore, determine whether or not it is safe to raise the speed.

The same thing holds true with respect to the inertia and centrifugal force loadings of the crankpin bearings. The centrifugal force on the rotating part of the connecting rod is proportional to the product of its weight into the stroke, and to get a corresponding value for the inertia force of the reciprocating weight we must multiply this weight by the length of stroke and the product by 1.225, which latter factor takes account of the forces due to the angularity of the connecting rod. We then get for the short stroke engine

$$(3.5 \times 22.3) + (1.225 \times 3.5 \times 49.2) = 289$$

and for the long stroke engine

$$(5.55 \times 21.6) + (1.225 \times 5.55 \times 32.3) = 339.$$

The crankpin of the short-stroke engine has a bearing area of $2 \times 1\tfrac{3}{4} = 3.5$ sq. in. and that of the long-stroke engine an area of $2 \times 1\tfrac{1}{2} = 3$ sq. in. Hence the crankpin bearing of the long-stroke engine will have to carry inertia and centrifugal loads greater than that of the short-stroke engine in the proportion of

$$(339/3)/(289/3.5) = 1.37$$

Thus the unit or specific load due to inertia forces is 38 per cent greater in the long than in the short-stroke engine in the case of the piston pin bearing, and 37 per cent in the case of the crank pin bearing. As the inertia load varies as the square of the speed, these figures would seem to indicate a speed limit set by inertia loads 17.5 per cent higher in the short-stroke than in the long-stroke engine. At these higher speeds, however, the side thrust on the piston would also be greater and necessitate lengthening the skirt and thus increasing the effective bearing surface of the piston on the cylinder wall. This would add to the weight of the piston, which in turn would reduce the permissible speed. After allowing for this increase in weight of the reciprocating parts it would appear that the speed limit for the short-stroke engine would be about 15 per cent higher than that of the long stroke.

Capacity of the Valves

We have so far assumed that the valves of both engines had the same capacity, that is, the same clear diameter and the same lift. This would assure equal volumetric efficiencies and therefore the same power outputs at the same speed. However, it is obviously possible to accommodate materially larger valves in the case of the short-stroke engine. Whether the valves are located in the cylinder head or in side pockets (L-head engine) the largest size valve which it is practically possible to accommodate has a clear diameter which is a fixed fraction of the cylinder bore (44 to 45 per cent). If the valve diameter is made larger the engine will have to be lengthened specially to make room for the valves, and this, of course, adds greatly to the weight. With the lift remaining the same, the capacity of a poppet valve increases directly with its clear diameter, and with both the short-stroke and the long-stroke engine provided with valves of the maximum practical size, the valves on the short-stroke engine would have much greater capacity (about 26 per cent more). This engine therefore should be able to run at much higher speeds as far as filling of the cylinders is concerned.

Another basis of comparison is that of the values of critical speeds with respect to torsional vibration. We used crankshafts of the same diameter for both engines on the assumption that, since the crankshaft for the

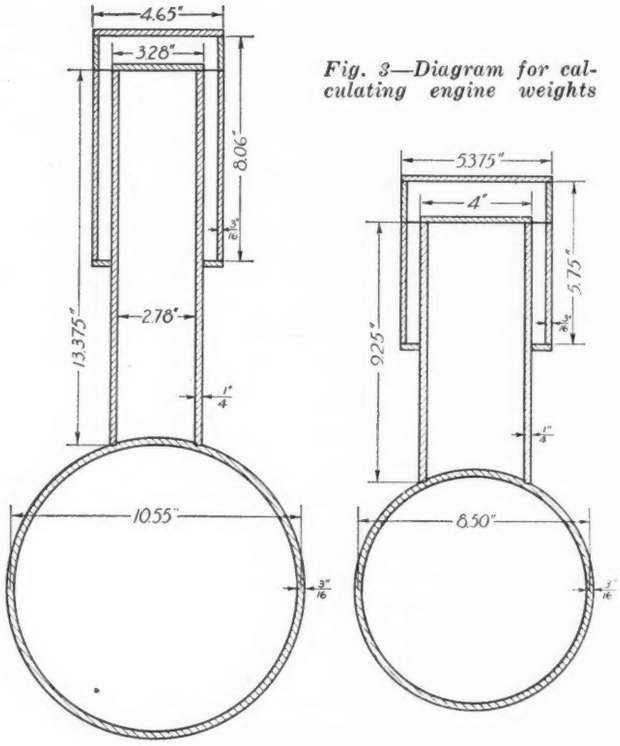


Fig. 3—Diagram for calculating engine weights

long-stroke engine would have a somewhat smaller overall length, but, on the other hand, would have longer crankarms, the torsional stiffness would be the same in both cases. But with the torsional stiffness the same the lowest critical speeds would not be the same, because this critical speed depends also on the moment of inertia of the crank and its attached parts. The amount which any particle contributes to the moment of inertia varies as the square of its distance from the axis of vibration, hence it is quite obvious that a crankshaft for a long-stroke engine, together with its attached parts, has a much higher moment of inertia than that for a short-stroke engine. Since the moment of inertia varies directly as the weight and as the square of the radius, the effect of the piston and connecting rod in the short-stroke engine may be represented by

$$71.5 \times 1.75^2 = 218$$

and in the long-stroke engine by

$$59.3 \times 2.775^2 = 415$$

Hence the long-stroke engine has much greater angular inertia. The critical speeds are inversely proportional to the square roots of the angular inertias of both the crank and its attached parts. The above represents only the angular inertia due to the attached parts, but the crankshaft for the long-stroke engine also has greater angular inertia, hence it is obvious that the long-stroke engine would run into synchronous vibration at a much lower speed than the short-stroke engine. From this point of view, therefore, the short-stroke engine could be operated at a higher speed safely.

We will now consider the effect of the stroke-bore ratio on the weight efficiency. In determining the weight of the engine structure we have to make approximations, as otherwise the calculation would take too long. Moreover, we can neglect the weights of all parts except those that will be influenced by the stroke-bore ratio.

The cylinder wall we will consider as a plain cylindrical shell ¼ in. thick in each case and the crankcase also as a plain cylinder of a mean diameter equal to the stroke plus 5 in. The addition of a constant value to the stroke is justified by the fact that in both engines the diameters of the crankpins and the big ends of the connecting rods are the same. We will assume the crankcase wall to be 3/16 in. thick in both cases. Theoretically the cylinder wall should be slightly less in the long-stroke engine, but, as a matter of fact, ¼ in. is used for cylinder walls throughout the range of passenger car engines. Moreover, the crankcase wall theoretically should be slightly thicker in the case of the long-stroke engine, and by making this the same in the two cases, the two errors practically cancel.

With the above assumptions and dividing the cylinder block and crankcase into simple geometrical forms as indicated in Fig. 3 we find by calculation that the cubic contents of the two parts in the short and long-stroke engines respectively are as follows:

	Short Stroke	Long Stroke
Cylinder Block	283	301
Crankcase	181	214
Total	464 cu. in.	515 cu. in.

This converted into pounds gives

	Short Stroke	Long Stroke
	121	134
Adding weight of reciprocating parts	26.8	20
Total	147.8 lb.	154 lb.

These weights, it is true, represent less than one-half the total weight of the complete engine, which would be in the neighborhood of 500 lb. But the parts not considered would either be of the same weight in both engines (the flywheel and its housing, for instance) or they would vary the same as the parts considered, hence the conclusion seems justified that an engine with bore and stroke equal weighs somewhat less than an engine of equal piston displacement in which the stroke is equal to twice the bore.

It has been generally assumed in the past that the long-stroke engine has an advantage over the short-stroke in having a more favorable form of combustion chamber, which results in a higher fuel economy. The difference should be most perceptible in the case of a valve-in-head engine in which the compression space is practically a continuation of the working cylinder. At the beginning of the power stroke, when the explosion occurs in the cylinder, the hot gases are in contact with a smaller area of cooling surface in the long than in the short-stroke engine, hence less heat should be lost to the cylinder walls in the former.

Let us take the two cylinders with 1:1 and 2:1 ratio, and assume the compression ratio to be 5 to 1 in both cases. The compression chamber in the one case then forms a cylinder 3.5 in. in diameter and ⅞ in. high, which has a surface area of 28.86 sq. in., while in the other it forms a cylinder 2.78 in. in diameter and 1.39 in. high and has a surface area of 24.31 sq. in. The difference, it will be noted, is not great, and it would be smaller if the combustion chambers were formed in side pockets, in which case the surface areas would be more or less

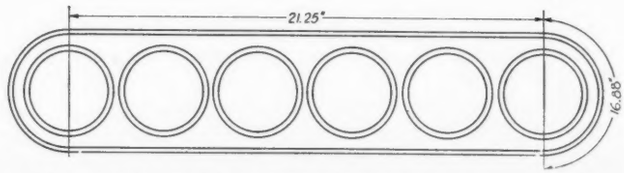


Fig. 4—Diagram for calculating weight of water jacket

independent of the stroke-bore ratio. Moreover, as the piston moves out on the power stroke the relation of the surface areas exposed to cooling action changes and at the end of the stroke in our examples the surface area is 67.36 sq. in. in the case of the short-stroke and 72.9 sq. in. in the case of the long-stroke engine. Of course, per unit of cooling surface, more heat is lost to the jacket at the beginning of the power stroke, when the temperature within the cylinder is exceedingly high.

Loss of heat from the burning gases occurs in two ways, by conduction through the walls and by radiation. Both losses are at all times proportional to the total exposed area, or the area of contact between gases and walls, but they vary somewhat differently with the temperature. Whereas the loss by radiation varies as the fourth power of the absolute temperature of the burning gases, the loss by conduction varies substantially as the temperature difference between the gases and the hot walls. Experimental evidence is to the effect that, considering the total losses throughout a power-stroke, that due to conduction greatly predominates over that due to radiation, and we may therefore neglect the loss by radiation.

Variation of Cooling Surface

In the diagram Fig. 5 the two straight inclined lines show the variation of the cooling surface with the point of the stroke, for the long and short-stroke engines respectively. A temperature curve is also drawn in, showing the approximate temperature difference between the burning gases and the cylinder wall throughout the power-stroke, under full load conditions. At the top of the figure are drawn in two curves which represent the product of the exposed surface into the temperature difference. The rate at which heat is lost during any short period of time is proportional to the temperature difference between the burning gases and cylinder wall, the area of the contact surface between the gases and the wall, and the time. The ordinates of these two curves represent the product of the first two factors, and since the length of stroke represents time, the areas under these curves practically represent the amounts of heat lost by radiation to the water jacket during one cycle in the long and short-stroke engines, respectively. Of course, to make distances along the axis of abscissas proportional to time it would be necessary to reconstruct the curves to make the abscissas represent crank motion rather than piston travel, because the former is directly proportional to the time, while the latter is not. However, this would result merely in foreshortening the ends of the diagram, as both ends are practically symmetrical, and would lead to the same conclusion.

It will be seen that the areas under the two curves are almost equal, for the advantage in this respect of the long-stroke during the early part of the stroke is lost during the latter part, when the cooling area is greater in the long than in the short-stroke engine. It is true that if the losses by radiation were considered they would slightly improve the relative showing of the long stroke, but, on the other hand, if we considered an L-head instead of a valve-in-head engine the result would be shifted again in favor of the short stroke.

Friction Losses

Another item that deserves investigation is that of friction losses. It is generally known that in automobile engines the piston friction forms the major portion of the frictional losses. This friction is substantially the shearing resistance of the oil film and is proportional to the area of the oil film. If the length of the piston is made proportional to the bore, the area of the

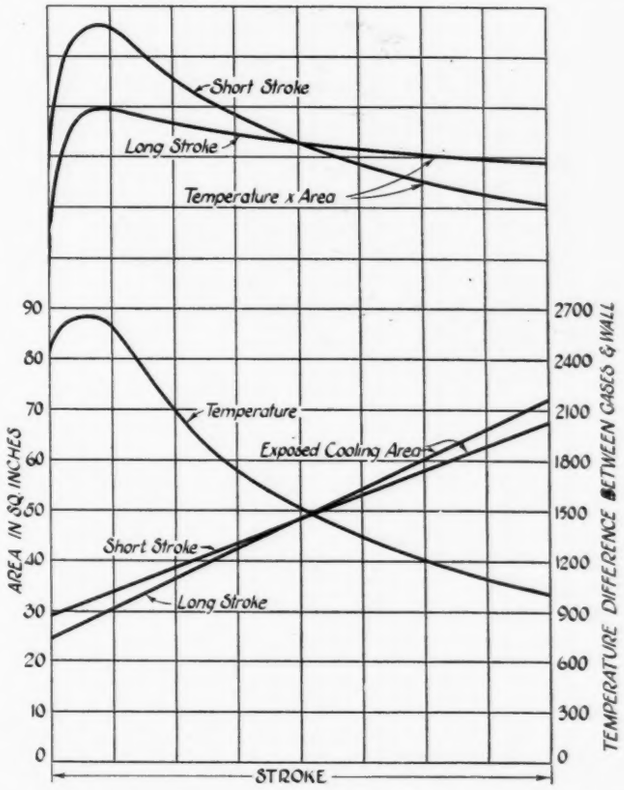


Fig. 5—Dependence of heat losses of stroke-bore ratio

oil film will be proportional to the square of the bore. The frictional loss is proportional to the friction and to motion of the piston against this friction, which motion is proportional to the stroke. Hence the frictional loss is proportional to the square of the bore and to the stroke; in other words, to the displacement, which is the same in both cases. This holds accurately only for the piston friction. In the case of the crankpin and piston pin bearings, since these bearings are somewhat larger in the short-stroke engine, the frictional loss would be slightly greater in its case, but the difference would be trifling.

Summary

It has been shown in the foregoing that if two engines are built generally along the same lines, both having the same piston displacement but one a stroke equal to twice its bore while in the other the stroke and bore are alike—

(1) Both engines will develop the same power at the same speed.

(2) The long-stroke engine will weigh slightly more than the short-stroke one.

(3) At the same speed the inertia forces are slightly greater in the long-stroke engine.

(4) At the same speed, unit loads on piston pin and crankpin bearings due to inertia are materially smaller in the short-stroke engine.

(5) With crankshafts of about the same diameter, corresponding critical speeds are higher in the short-stroke engine.

(6) It is possible to use much larger valves in the short-stroke engine.

(7) The short-stroke engine can be run safely at higher speeds of revolution and develop more power.

(8) From the standpoint of fuel economy the long stroke may have a slight advantage, but hardly sufficient to be detected by means of commercial instruments.

OLDSMOBILE. An attractive panel shaped to conform with the design of the name-plate

STUTZ. A striking effect with simplicity as the keynote. The monogram adds a finishing touch

Greater Beauty in The Newer Instrument Boards

General trend is toward consolidation of all instruments in single panel of pleasing design with indirect lighting to eliminate glare at night. Attractive effects obtained.

By K. W. Stillman

IN line with the many detail changes which have taken place within the past year or two in body construction for the purpose of increasing the beauty and utility of the bodies, the instrument panels generally fitted to cars now in production are quite different from those used but a short time ago.

The general trend at present is toward a consolidation of all the instruments in a single panel of pleasing design with indirect lighting—lamps placed behind the panels instead of over them—so that there is no glare to interfere with the reading of the instruments while driving at night.

More instruments are being provided as a rule than was the custom in the past, with the result that it is possible on many of the cars of today to obtain full information about the condition of nearly every important factor in the operation of the car merely by glancing at the instrument board.

The speedometer giving rate of speed as well as trip and total mileage was, of course, one of the first instruments regularly fitted on cars and this has been retained. The ignition switch is another item of present-day equipment which dates back to the early days of car manufacture. A number of the other instruments quite generally found on the dashes of today's automobiles are rather recent arrivals there.

Temperature-indicating devices have been incorporated in the instrument panel in many cars. Ammeters are quite standard equipment now, as are oil gages. Not quite so common, but still to be found on many panels, are gasoline gages.

Improvements made to the carburetion system have added to the number of instruments fitted to some cars. The choke is an old friend, although it is of interest to know that few European cars are thus equipped. In addition to the choke there is sometimes a means for adjusting the mixture of fuel and air and with the growing adoption of carburetor heat control still one more attachment is made necessary.

The light switch is commonly made a part of the instrument board although the recent popularity of dimmer controls has caused a number of manufacturers to place them on the steering wheel or post within easy reach of the driver's hand. On many makes of cars, particularly those in the higher price classes, clocks are part of the standard equipment and are uniformly included in the instrument panel assembly.

In the general design of the instrument panels some manufacturers have tried with more or less success to use something reminiscent of the radiator name-plate

An Instrument Board of 10 Years Ago

INSTRUMENT boards of 10 years ago were "spotty" and unattractive as compared with present-day designs. The above is a good example of the practice that prevailed at that time. The instruments, from left to right, are: Mixture control lever; starting button and ignition switch; ammeter; lighting switch and dash light button; gasoline pressure gage; hand pressure pump; speedometer. As the illustration shows, each instrument was a unit unto itself, with no attempt made to get the panel grouping effects that are so popular today.

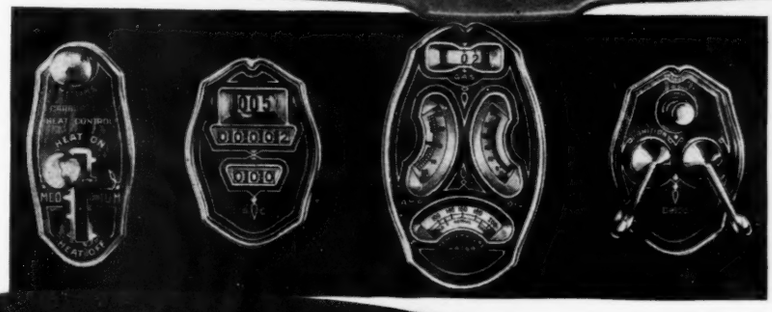
or the maker's trademark. Most makers, however, appear to have sought merely a pleasing form in which the instruments might be grouped in a more or less symmetrical manner so that they would all be quite legible from the driver's seat.

The Cadillac panel illustrated is typical of this symmetry. The speedometer is set off by the clock, and the ammeter, oil gage, gasoline gage and gasoline pressure gage are grouped about the Cadillac monogram in the center of the panel. The panel material is of walnut with embossed German-silver decorations having the appearance of silver inlay.

The Oldsmobile panel contains four instruments grouped about the speedometer, one of them being an unique ignition lock and switch. It may be noticed that this panel follows the pattern of the company's name-plate while the smaller inter-panel inclosing the speedometer carries out the design of the radiator shell. In the Nash panel—fitted to Advance Six chassis—five instruments are effectively grouped about the Nash monogram, with the carburetor heat control placed outside and below the panel.

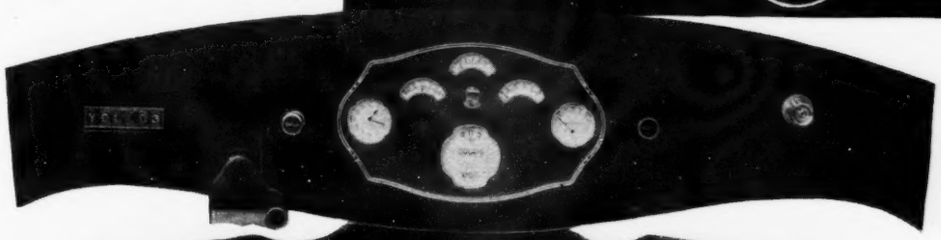
The Hupmobile Six panel is of odd design with a sort of arch-like effect arising from the choke control on one side and from the carburetor heat control on the other. The company monogram is seen to be an important part of the layout. The panel employed on the Hupmobile Eight is of quite different design and is also graced with a rectangular-shaped clock which matches the speedometer.

NASH. The monogram is also a prominent part of this design. Carburetor heat control well balanced



OAKLAND. A pleasing three-panel arrangement

BUICK. A nice effect with four panels by carrying out the radiator design



MARMON. Six instruments inclosed in a panel with outline resembling the Marmon name-plate

ELCAR. Distinction is gained by angularity of ignition and choke controls on one side and fuel mixture control on the other

CADILLAC. A model of symmetry with the instruments grouped about the monogram

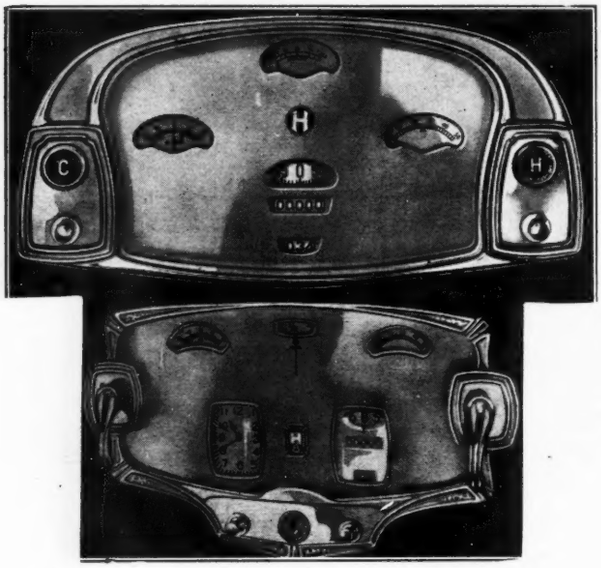
The outline of the Marmon panel resembles that of the Marmon radiator name-plate, while the six instruments included in the layout are quite symmetrical in their arrangement. Outside the panel, in this case, are the ignition switch and choke lever.

Stutz Moves Speedometer

A recent change in the Stutz panel has been the interchange of the clock for the speedometer so that the latter may be more easily read at night. Here, again, the car monogram plays an important role in the design of the panel. The Elcar panel gains distinction by the angularity of the ignition and choke controls on one side and of the fuel mixture control on the other.

In the Oakland panel a bit different treatment is secured by using three distinct panels but obtaining unity in the design by the use of a molding enclosing all

the instruments. Among other cars, Buick is one which still obtains pleasing effects with the use of a number of individual panels in each one of which may be placed



Above: Instrument panel of Hupmobile Six. Below: A different design is found in the Hupmobile Eight, where it was necessary to provide for several additional instruments

one or more instruments. One panel contains fuel gage, ammeter, oil gage and water temperature indicator; ignition and light controls occupy a second panel; the speedometer is contained in a third and the choke and carburetor heat controls make up the fourth. Unity is obtained among these four panels by employing the same general outline and design for them.

A Four-Speed Planetary Transmission

A PLANETARY transmission giving four forward speeds and a reverse is being manufactured in England by Furness Gears, Ltd., 169 Coldharbour Lane, Loughborough Junction, London SE-5. The transmission is of the all-spur type and differs from those now in use and the many designs in vogue in this country during the early years of the automobile industry in that only one of the three planetary sets is active when one of the lower gears or the reverse is in operation.

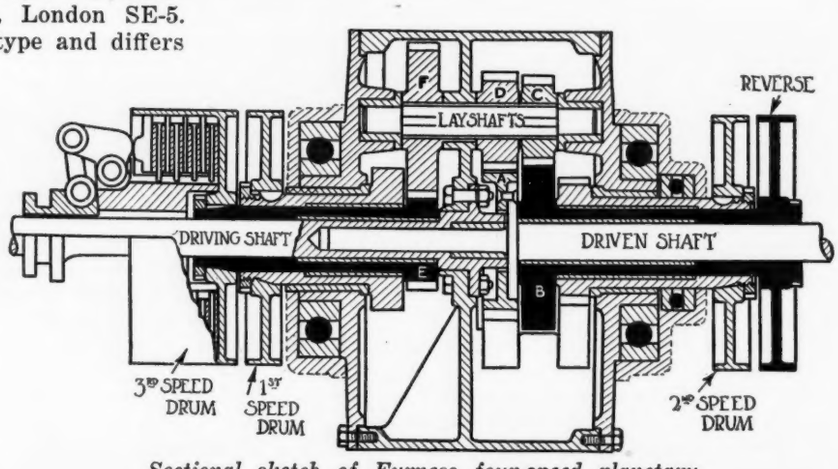
Referring to the sectional sketch herewith, which is redrawn from *The Autocar*, the driving shaft is rigidly connected by bolting to a cross wall of the cylindrical housing in which all of the gears are located. Thus the housing and the three planetary sets, which have bearings in it, rotate at all times at engine speed. The drawing is a section through one of the planetary assemblies. The driven shaft at its inner end carries a gear *A* which meshes with pinion *D* on the planetary shaft. Another pinion *C* on the same planetary shaft meshes with gear *B* carried on a hollow shaft eccentric with the driven shaft. By applying a brake to the reverse drum at the extreme right, thus holding gear *B* from rotation, pinion *C* is caused to roll upon it, and since *D* is larger in diameter than *C*, it causes gear *A* to turn in the opposite direction to that of the drum, thus giving the reverse motion.

This same planetary set serves for the third forward speed. To obtain this speed the brake on the drum over the friction clutch is applied, whereby gear *E* is held in rotation. This causes *F* to roll on *E*, and *D*, of course, rotates with *F*. But since *F* is much larger than *E*, its motion around its own axis is comparatively slow. The motion imparted to the driven gear *A* by pinion *D* therefore depends more upon the planetary motion of the latter around the axis of the housing than upon its motion around its own axis, and the motion of the driveshaft is forward and comparatively fast.

How High Speed is Obtained

The two other lower forward speeds are obtained by gear trains of the same kind as *E, F, D, A,* but of different proportions, while the high speed is obtained by locking the whole gear together by means of the friction clutch at the right.

Control of the gear is much like that of a car with shift gears. Each of the four brakes for the lower forward and the reverse speeds is applied by means of a lever actuated by a cam. The four cams are mounted on the same shaft. This is a sliding shaft and the cams are so spaced that only one of them can be opposite its particular lever at one time. The shaft is moved axially into the positions corresponding to the different gears by means of a ball-ended lever corresponding to the conventional shift lever, while the brake of the particular gear for which the lever is set is applied automatically by means of a coiled spring. When it is desired to disengage the gear the driver presses on a pedal corresponding to the clutch pedal, which compresses the spring and therefore releases the brake. This form of actuating mechanism was probably chosen because it would obviate the necessity of drivers familiar with the ordinary sliding gear "leaning over" when preparing to drive a car equipped with a gear of this type. The advantage of the planetary over the sliding gear is that it requires no skill to manipulate it.



Sectional sketch of Furness four-speed planetary transmission gear

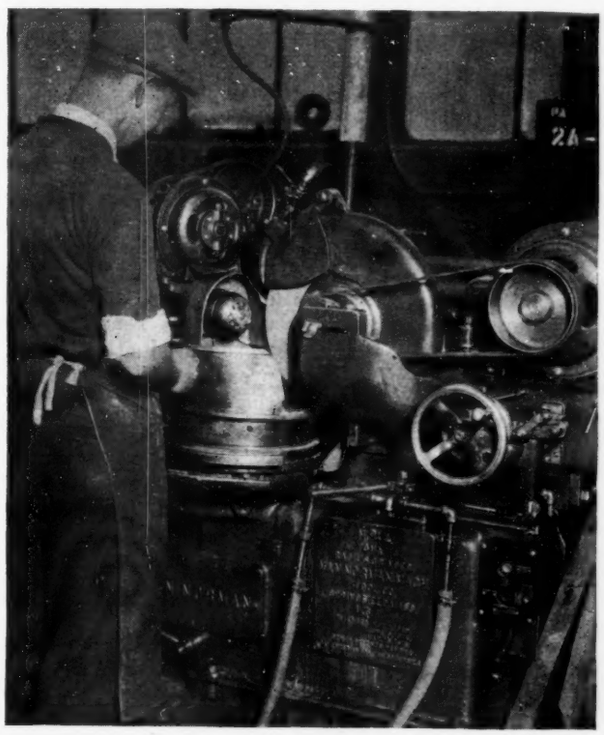
Differential Equalizing Pinions *Finished* on Automatic Radius Grinder

Machine is equipped with air-operated ball chuck and turns out over 100 pieces per hr.

FINAL finishing of the spherical thrust surfaces on differential equalizing pinions in one of the large Detroit plants recently has been transferred to a Van Norman No. 44 automatic radius grinder. This machine, equipped with an air-operated ball chuck in which the pinions are located with relation to the pitch cone, is turning out well over 100 pieces per hour with limits of plus or minus .001 in. This limit applies to a set dimension between predetermined points on the pitch cone and the spherical surface. Following ball bearing practice, for which this type of machine was designed originally, the finish is high and practically free from scores. A special grade wheel is used.

As shown by the accompanying illustration, the pinion is held for the operation by an expanding draw-in chuck. The chuck is air-operated with the control on the front of the bed of the machine at the right side adjacent to the push-button control which governs the operation of both wheel and work spindle motors. As the chuck is closed, an expanding collet in the bore of the pinion draws the part in against a nest of balls which seat between the teeth to produce correct centering and alignment.

This spindle and chuck are carried on an oscillating table which has a total swing of more than 180 deg. in the horizontal plane, although it is set so that less than 30 deg. of this motion are used for this operation. Loading is accomplished with the work spindle head moved toward the front of the machine so that about 10 in. clearance exists between the chuck and the wheel. Due to this liberal clearance and the air chuck features, it is not necessary to stop oscillation of the table during the loading operation.



Van Norman automatic radius grinder is equipped with oscillating table equipped with air chuck for grinding spherical packs of differential equalizing pinions

After loading, the center of the work spindle is shifted back to coincide with the center of oscillation by the lever shown in the operator's left hand. This center line intersects the edge of the wheel nearest the front of the machine and thus permits the oscillating spindle to be moved out into the loading position regardless of the momentary angular position. When in actual operation, the work never leaves the effective surface of the wheel, as the oscillation is limited so that the side of the pinion nearest the back of the machine just sweeps the circular formed cutting surface of the wheel. No diamond dressing or similar care of the wheel is required as the angular motion of the pinion develops the proper radial form on the surface of the wheel. In order to save time, new wheels are dressed to approximately correct form but no further dressing is required.

About .010 in. of stock is removed during this operation. Automatic ratchet feed to a set stop is used and the operation continues until the wheel ceases sparking. Wheel wear is compensated manually according to indications taken from the testing fixture which is placed alongside the machine. Both spindles are equipped with ball bearings. In the case of the wheel head, the spindle is stationary and ball bearings are interposed between this member and the wheel hub.

One reason for making the thrust surfaces at the outer end of the differential pinions spherical is that for a given inside diameter of the housing it permits of longer bearing surfaces on the spider which supports the pinions. Besides, the inner surface of the housing can be more readily machined than if it contained flat thrust surfaces.

Plenty of Rubber This Year, But What of Next?

Rubber pool is working in market to accumulate stocks which will assure American manufacturers a measure of protection against possible shortage of crude in 1928.

By John C. Gourlie

ALTHOUGH American rubber consumers are assured an adequate supply of the crude in the current year, despite the prospect of further restriction in export allowances beginning May 1, the situation is likely to be different next year, and this is what the rubber pool that is functioning for American tire and motor car companies is endeavoring to prepare for.

The obvious sufficiency of current supplies, coupled with shipments in the remainder of the year, to cover the needs of the industry is the reason why prices of crude did not respond with a pronounced upward move to the cut in exports to 70 per cent of standard production made under the Stevenson Act on Feb. 1. The price trend was actually downward for a time.

During the quarter beginning Nov. 1, 1926, the allowance was 80 per cent, yet at the end of the calendar year there were estimated to be 72,500 tons in the hands of dealers and manufacturers and in transit in the United States, while another 52,000 tons were afloat on American-bound vessels. Total world stocks were estimated at 211,000 tons, against an estimated consumption for the year of 550,000 tons, of which the United States would use about 370,000 tons, according to Henderson, Helm & Co.

Gaging Supply and Demand

Rubber is probably unique among the important raw materials of commerce in this respect, that not only the world's needs but the world's supply can be fairly accurately foretold for quite a period in advance. Crop failures are unknown and increases in acreage planted are without effect for five or six years.

Hence the authority previously named is able to predict that the surplus of production over consumption for the world this year will be 57,000 tons, even if from May 1 to Oct. 31 the export allowance is 60 per cent. The figure is reached as follows:

Standard Production, Nov. 1, 1926-Oct. 31, 1927

Malaya	331,000 tons (est.)
Ceylon	74,000 tons
Total restricted area	**405,000 tons**

Estimated Production

(Basis, 80—70—60—60 per cent of standard in four restriction quarters.)

Restricted:	Malaya	223,000	
	Ceylon	50,000	
	Unused Coupons	41,000	
Total		314,000	tons
Unrestricted:	Dutch East Indies	210,000	
	Singapore and Penang	6,000	
	Other Eastern	38,000	
	Brazil and other wild	39,000	
Total		293,000	tons
	World Production	607,000	
	World Consumption	550,000	
Surplus		57,000	tons

For statistical purposes the restriction quarters end opportunely, as it takes about two months for exported rubber to reach the consuming countries. In other words production in the year ending Nov. 1 will be approximately the quantity available for consumption in the calendar year. The unused coupons referred to in the tables represent the extent to which producers failed to avail themselves of their exportable allowances in previous periods. They are an important factor this year but are not likely to be next year. The time limit has been taken off the coupons but it is expected they will be used within the next few months.

Curtailment Due May 1

The curtailment to 60 per cent of standard production will take place May 1, unless in the current quarter prices average more than 21 pence. Prices this month have been around 38 cents, and a pronounced recovery, for a number of reasons, is not looked for in the immediate future. For an increase to 80 per cent, prices would have to average more than 24 pence.

If the 70 per cent of standard rate could be continued

for the remainder of the year, the indicated surplus of production (or shipments) over consumption would be 78,000 tons.

What will happen next year is, of course, purely conjectural. Not only is the status of restriction in doubt, but an important element of uncertainty rests in the long-range effect of the large sales last year of second-grade tires, which may be expected to wear out sooner and result in a large increase in the replacement market later on. It seems plain, however, that the indicated surplus of production this year will not hold true of next. On the other hand the large stocks both here and in London this year, which will probably not be very greatly reduced during 1927, will provide a cushion for next year's requirements.

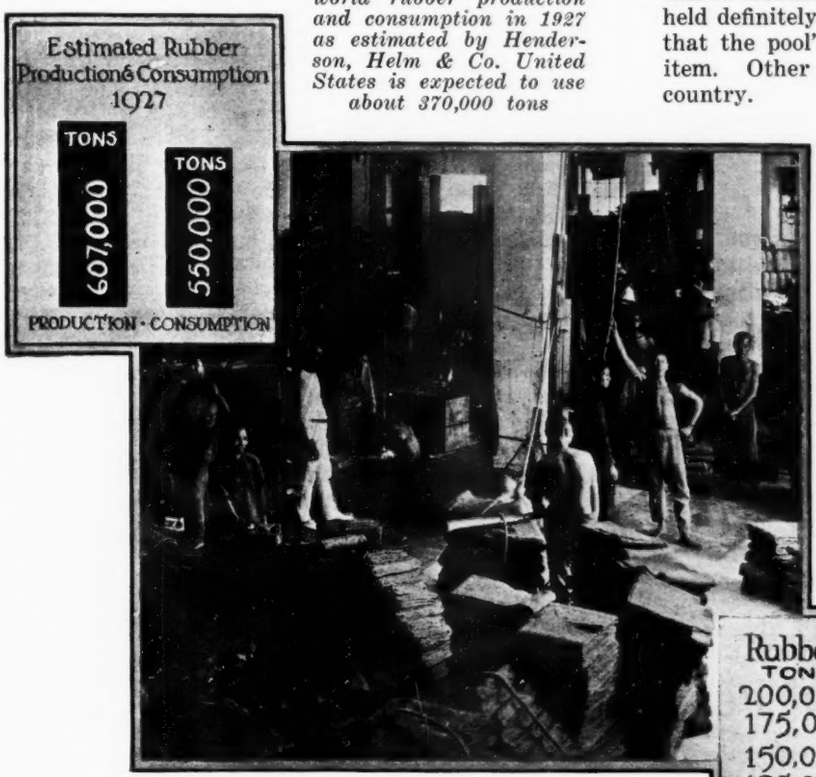
It is in this matter that the operations of the rubber pool assume importance. The dealings of the pool are necessarily secret, as they are in a sense speculative, involving the buying of rubber when supplies are plentiful and prices cheap and selling when curtailment of supplies tends to raise prices. But this, obviously, is not gambling, the form of sport that is usually thought of when speculation is mentioned. Buying and selling at the right time is the prime function of most business, and the rubber consumers are merely banding together so that their knowledge and resources may be made more effective.

As rubber restriction is being practised now, the chances for large profits, actually or on paper, for the rubber pool are hardly within the realms of possibility nor would they be good business for the consumers. On the contrary, it is logical to assume that the organizers of the pool hope that prices will be stabilized as nearly as possible so that inventory losses may be eliminated and fluctuations in the prices of tires and other rubber goods avoided.

With these purposes in mind, therefore, it seems plain that the pool has been accumulating rubber at recent prices, which, in view of the level the restriction regulations are seeking, must be regarded as favorable to buyers. Exports are curtailed when prices are under 21 pence and released when they are over 24 pence. If the pool buys at or below the former figure it might sell or not according to the exigencies of the situation in the stabilization area but would almost certainly begin to sell when a figure over 24 pence was reached.

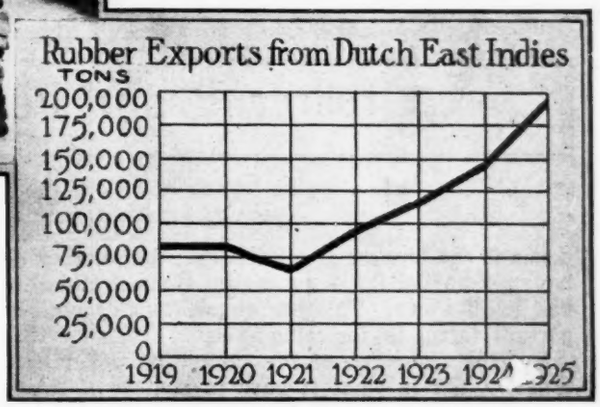
Gossip in the rubber trade, which is repeated for what it is worth, credits the pool with having already accumulated a substantial part of the 40,000-50,000 tons set for its quota under the financing arrangements made when the pool was organized. London stocks of rubber on Feb. 5 amounted to 55,740 tons, and an unofficial estimate had it that 15,000 tons of this total were held definitely for American account and it is supposed that the pool's holdings are partly represented by the item. Other stocks, it is believed, are held in this country.

Left—Comparison of world rubber production and consumption in 1927 as estimated by Henderson, Helm & Co. United States is expected to use about 370,000 tons



While there may have been some disappointment that pool buying did not bring the price above the level at which further restriction was made it seems that the purchases served to hold the price within striking distance of 21 pence and established a better chance for preventing another cut in the next restriction quarter.

Left—Preparing sheet rubber for shipment at Singapore. Below—Graph showing how rubber exports from Dutch East Indies have grown. The significance of this lies in the fact that this is non-restricted territory



Aside from this, the pool, if its operations have been as the trade supposes, has performed the all-important function of financing the accumulation and holding of a substantial stock of crude for the prospective period of less available supplies. Its sales, when made, should prevent a disturbing advance in prices in the period before releases in exports can restore the equilibrium of demand and supply.

A current subject of earnest debate when the rubber situation is considered is how long the British can continue to attempt price regulation without disastrous consequences to producers in the restricted areas. The impression appears general that production in non-restricted countries is being stepped up so rapidly that the "British monopoly" must soon be broken, if in fact it has not already been bent.

On the contrary, the available figures, though regrettably incomplete, all tend to show that the British will continue to hold the whip hand for several years. Definite segregation of figures covering production in restricted and non-restricted areas was not feasible prior to 1926, when out of 613,000 tons for the world, 275,000 were produced in unrestricted countries. Thus 55 per cent of the available rubber was British at a time when other sources of supply were undoubtedly producing to the limit of capacity. Even this year, with further restriction, the British share will be well over 50 per cent.

Acreage in Non-Restricted Areas

Acreage planted in unrestricted areas is of course the dominating factor. The following figures showing new acreage in 1918, the peak year, and thereafter, are pertinent to the question:

1918	402,000	1922	66,000
1919	328,000	1923	46,000
1920	208,000	1924	50,000
1921	126,000	1925	200,000*

*Estimated.

Allowing six years for new trees to come into bearing, and between 6 and 7 acres to 1 ton of rubber, it is apparent that additional production facilities within the next five or six years are negligible. A further point is that a large part of the increased production and increased planting in non-restricted areas has been in the Dutch East Indies, and there is always the possibility that the Dutch will introduce restriction when the prosperity of their planters, inflated beyond imagination by the British policy, is threatened by a world surplus that the British can no longer control.

The following table shows the increase in exports from the Dutch East Indies since 1918:

	Plantation	Native dry
1919	66,000 tons	13,000 tons
1920	69,000	10,000
1921	62,000	6,000
1922	72,000	17,000
1923	82,000	36,000
1924	90,000	56,000
1925	106,000	85,000

It will be seen that the most striking gains were made by the native producers, possibly because some of the plantations are British-owned and have voluntarily followed the restriction program. But the increase in native production from 3 per cent of the world's total in 1920 to probably 15 per cent last year has focused the attention of the rubber trade, and led to predictions in some quarters that rubber will eventually become a native-controlled industry, like copra.

Aided by practically free land, the natives have turned to rubber production in large numbers. The better standard of living that has come to the native with rubber profits has further stimulated his willingness to work, and experience has shown that lower prices merely make him work harder to buy the luxuries that have become necessities to him. And with low costs of production, native production will continue so long as rubber remains as high as 9 to 18 cents a pound, according to Dutch investigators.

Over-tapping and other evils supposed to be incident to native rubber operations have not restricted production to nearly the extent predicted some time ago. Methods have improved and native journals as well as the Dutch government are aiding in the propagation of sound methods of cultivation.

It is evident, therefore, that the long run native competition may assume formidable proportions, always barring the possibility of restriction measures by the Dutch.

Greater Profit Per Unit Industry's Need

(Continued from page 320)

dollar is the biggest of all dollars. While other dollars have got smaller it has got bigger at times and at others has held its own. This has unquestionably been an important factor in fostering sales.

But the real value of the automotive dollar lies, fortunately, not in what it buys in pounds of fabricated material but in what it buys in performance, comfort, service and appearance. Much of this value has been acquired without increase of unit cost to the manufacturer. Better design has provided it. Still better design will stabilize the automotive dollar in the future, with the result that production economies, unrelated to production increases, may be used to increase the manufacturer's unit profit; provided, of course, they are not passed on to the public in the form of price cuts.

Further possible contributions to greater unit profits might be expected from greater efficiency in distribution, from reduced cost of getting dealers, from a reduction of dealer turnover through better dealer cooperation, from more effective selling.

If all of these savings could be held within the industry for an effective period, the car manufacturer, to his own advantage, could share his higher unit profit with the parts man and give him a chance to increase his. He says he needs it and the industry needs him.

Obviously there are large practical difficulties in the way of fulfilment of the greater profit per unit idea. Besides our general ills we have our individual problems. We feel sure at times that we must be opportunists. We may not like some of our practices in their theoretical aspects but as practical expedients we think them good.

We have the fear of a competitor's possible price reductions coupled with the temptation to beat him to it when circumstances or conditions press. We have the underpriced product of the over-expanded plant, the plant with inflexible equipment and over-inflated overhead. All of these, with more like them, drive us to greater output with only a remote possibility of making a partly respectable net and the imminent prospect of having something happen to some one who, each believes, will be the other fellow.

The articles which are announced in the box on the second page of this article will give due weight to all these difficulties. They will indicate what might be done, perhaps in spite of them.

2 Months of Compulsory Insurance *in* Massachusetts

Experience thus far with new law in Bay State indicates that sales of new and used vehicles have been adversely affected. Most "kicks" coming from truck fleet owners and taxicab men.

By Norman G. Shidle

IN 24 states this year bills have been presented designed to compel automobile drivers to carry liability insurance. One state, Massachusetts, passed such a bill last year and its law went into effect on Jan. 1.

Since then all eyes have been focused on the Bay State. For about two months now it has been functioning as the compulsory liability insurance proving grounds. Clearly it is too early to procure sufficient data upon which to base even preliminary conclusions as to the ultimate benefits or disadvantages of the experiment, but the best information available from the welter of conflicting opinion now emanating from there seems to indicate a few facts as outstanding, some of them the result of a compulsory liability law *per se* and others due to the peculiar provisions of the Massachusetts law in particular. Among these facts are the following:

1. Motor vehicle registrations in Massachusetts for the first six weeks of 1927 are considerably behind registrations during the same period last year.

2. No great popular outcry against payment of the insurance charges has come from the average motorist, however, so far as can be determined. The average owner seems to be quietly paying his premium charges, taking out his insurance, obtaining his license plates and silently praying that no new laws will be enacted that will force him to hand out more money next year for the privilege of using his automobile.

3. An already sluggish used car market has not been helped any by the added burden of insurance premiums which are the same on the cheap used car as on its new brother of similar size, f.o.b. price and operating base.

4. Insurance companies are saying little and are working their actuaries overtime on rate studies, as the rates may be changed next year after the insurance companies have had a better chance to figure adequate rates from a year's experience. The rates can be changed, however, only with the permission of the insurance commissioner or by the Supreme Court.

5. The insurance companies are being compelled to take good risks with bad at rates lower than those at which they previously took only good risks; their clerical work is vastly increased and they are not at all confident that the greatly increased volume which they are getting will result in any similar increase in profit. State insurance, moreover, always looms ominously in the offing, although expert opinion seems to be that the chance of state insurance in Massachusetts is not very great for some years to come, despite current agitation from some quarters for such provision.

6. The most dissatisfied parties to the new law are the truck fleet owners and taxicab operators, the latter particularly feeling that they have had a raw deal. Truck fleet operators, most of whom carried insurance previously but at "fleet rates," now must pay just as much per vehicle as the man who insures only one truck; thus most of them are getting the same thing as they had before but are paying about twice as much for it.

7. Operators of buses and of trucks operating between fixed terminals on regular schedules are little concerned with the new law since it does not affect "motor vehicles operating as common carriers along a fixed route, stopping to take on and discharge passengers, such as a railroad."

AS the weeks roll by, the automotive industry is keeping one eye on Massachusetts, to see how its compulsory liability insurance law is working out, and the other on the 23 other states in which similar legislation has been introduced.

According to the latest records of the Motor Vehicle Conference Committee, compulsory liability insurance bills have been introduced thus far in Alabama, California, Connecticut, Idaho, Illinois, Indiana, Iowa, Maryland, Massachusetts (proposed revisions of present law), Minnesota, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, Tennessee, Utah, West Virginia and Wisconsin.

COMPULSORY automobile liability insurance is opposed by the automotive industry through the Motor Vehicle Conference Committee and through various individual automotive organizations.

Generally speaking, the insurance companies of the country oppose it, despite the fact that a law such as that passed in Massachusetts will bring them many thousands of dollars' worth of new business.

The sentiment of the public at large is difficult to gage, of course, but many private citizens are known to favor such legislation on sentimental grounds, sometimes without being able to see or state clearly just how such a law practically will achieve all the ends expected of it.

With characteristic vigor and clarity, representatives of the automotive industry are trying to megaphone facts and logical arguments on the subject in the hope of minimizing at least some of the "there-ought-to-be-a-law" hysteria which threatens to arise in a few parts of the country this year.

The reduction in motor vehicle registrations, in some ways the factor of greatest commercial importance to the automotive manufacturer, probably has been brought about by a combination of factors. A provision in the Massachusetts law makes it possible to get a reduction in insurance rates when the car is operated only between April 1 and Dec. 31. This provision, it is thought by competent observers, is chiefly responsible for the retardation in registrations noticeable thus far this year. After April 1, it is thought, another registration peak will occur, similar to the single one which previously has been built up only in January of each year.

That a certain number of cars have been taken from the road as a result of the new law which otherwise would be in operation, however, cannot be denied. Opinions differ as to whether or not this number is of any considerable magnitude and probably the mid-year registration totals will provide the first reasonably accurate determination of this point. One Massachusetts observer says, "The law may drive a few hundred cars off the roads but these for the most part will be $25 flivvers and wrecks rescued from the junk piles." Others, however, are inclined to believe that the number may mount to the thousands instead of the hundreds.

Even if the new law doesn't materially reduce the number of old cars registered, this latter group points out, it may materially reduce the number of new and used car sales, the used car market being particularly likely to be affected adversely. Since used cars generally have not been moving any too well in the last month or two, it is difficult to attribute to the new law all of the slowness with which these vehicles are being sold. The following comment from our Boston correspondent, however, is interesting in this regard. He writes:

"Boston motor car dealers believe that the compulsory automobile insurance law in Massachusetts has slowed down sales of new and used cars for January and February through owners wishing to try to save the first quarter premium if they find that is possible, and also the personal property tax, the total for the two averaging about $50. They expect this situation will pass by April 1."

The taxicab companies and the truck fleet operators undoubtedly are having a difficult time of it under the new law.

The taxicab operator seems to have the most obviously just complaint. Under the law the rates for compulsory insurance were promulgated by the State Insurance Commissioner who was also charged with the task of holding a public hearing before the rates were announced. At this hearing, last August, the taxicab men asked for a "mileage rate" rather than a flat rate. The commissioner gave it to them but he made the rate so high as almost to be prohibitive. Taxicab operators in Boston, for example, are forced to pay on a mileage basis about $300 to $500 a year for compulsory insurance. The rate is slightly less in rural Massachusetts. This charge, together with the increased cost of operation in recent years, has placed the taxicab companies in an unenviable position.

In January the Boston cab companies met and agreed to a surcharge of 10 cents per trip to pay for their insurance. This 10-cent charge would hold good regardless of the length of the trip. Three or four days later the independent companies withdrew from the agreement and dropped the surcharge. They said that they would do more business without the extra 10 cents and that this increased business would help to pay their insurance premiums.

The taxicab companies are opposed to the present law but feel that for the time being there is nothing they can do about it. They can wait until sufficient experience develops for them to seek a readjustment of rates and they are confident that the first year's accident experience among taxicabs will be such that their rate will be slashed considerably. In the meantime they are "sore" and they make no bones about it.

The operators of fleets of trucks are in a position greatly similar to the taxicab companies. Their insurance rates have been increased by compulsory insurance. As noted previously, before the new law went into effect they were able to obtain "fleet rates." Now they must pay just as much as the man who insures only one truck. Furthermore, their new rate is much higher than it was last year, even for individual trucks. Inasmuch as most truck owners have always carried liability insurance, they are paying twice as much now and getting only what they got before. While many of these fleet operators favor compulsory insurance in principle, they are unanimous in the belief that they have been made to suffer from what they believe to be unjust rates.

So far few trucking concerns have had to increase their haulage rates but many fleet operators feel that they will have to do so if they are to make any money this year.

Bus owners are not affected by compulsory insurance as they have long had to furnish security in compliance with laws regulating public utilities and interstate commerce. They fall in the same class as street cars.

The first six weeks of the new Massachusetts law have proved that few persons will be deprived of the use of their automobiles because of inability to secure insurance. The law provides for motorists who are refused insurance by permitting them to take their cases to a Board of Appeal, composed of the registrar of motor vehicles, the commissioner of insurance and an assistant attorney-general. This board has not been as busy as

it was thought it would be. The insurance companies have taken the bad risks with the good, inasmuch as they have had no way of telling whether or not a man was a good risk or a bad one. If he had been a particularly reckless driver he would have had his license revoked by the state, anyhow, and wouldn't have bothered to take out insurance. In one case the board ruled against an insurance company which had refused to insure an auto renting company because they "didn't want the business." The insurance company contended that other companies wanted this class of business and that inasmuch as they didn't want it, it should be given to those firms desiring it. The board ruled, however, that this wasn't sufficient reason for refusing the applicant coverage and ordered the insurance company to issue a policy to the auto renting company. In most cases scheduled for hearing before the Board of Appeals the petitioners have succeeded in securing coverage from some other company before their case has been called. For this reason, the board has not been very busy and has heard only a few cases.

Legislative Angle Peculiar

The legislative angle of the compulsory insurance law is a peculiar one. Here the prophets have taken a licking. All along it has been predicted that the legislators would wrestle with amendments to the new law during their present session. It was also thought that state insurance would inject itself very seriously into the scene in the statehouse. Several bills advocating state insurance have already gone down to defeat in committee and other bills of a similar nature are also expected to be killed in committee. It is extremely doubtful that the floor of either the Massachusetts House or the Senate will debate state insurance in this session.

"Let's give compulsory insurance a chance," one legislator from Boston said in conversation the other day. "I think it's a good law. It has certain imperfections, undoubtedly, but it will have to have these removed in time. Let the law remain as it is for at least a year. By that time we will have something to go by."

This seems to be the feeling of the Legislature. State insurance seems at this time to be nothing more than a remote possibility. The rates are now fixed by the state and this is felt to be sufficiently far enough for the state to go for the present, at least. Some legislators favor state insurance but their favor is believed by some to be more in the nature of a gesture than anything else. One amendment to the law which received serious consideration by the Insurance Committee of the Legislature was the bill introduced by a Quincy representative, details of which appeared on page 312 of *Automotive Industries* of Feb. 19, to have a uniform rate for the entire state.

The new law is popularly termed the Compulsory Automobile Insurance Law. As a matter of fact, it expressly provides for the taking out of a surety bond or the depositing of cash or securities with the state in case a motorist does not want insurance. However, the rates for surety bonds are the same as the rates for insurance policies, and as a surety bond is only a guarantee that judgments against the bondholder for injuries his automobile causes will be paid, few persons, if any, have chosen this method of complying with the law. The surety company has a right of action against the bondholder for any money it is forced to pay out on his account. In like manner, it does not pay the motorists to deposit money with the state. Any judgments against him for injuries or deaths his machine causes will come out of this fund. Furthermore, the fund must be reimbursed if it is depleted by such payments. Nevertheless, some five or six persons have made cash deposits with the state.

Even the poorer motorists can obtain their insurance policies through the operation of a number of automobile insurance finance companies which have sprung up in the last four months. These companies finance the purchase of an insurance policy in much the same manner as their counterparts, the automobile finance companies, finance the purchase of an automobile. They have been doing a good business and have been the means of many persons obtaining insurance who would never have been able to do so if they had been forced to pay for it in a lump sum.

To the Legislatures of 23 other states that are considering the passage this year of laws similar to the Massachusetts measure, the automotive industry is urging thorough consideration of all conditions before definite action be taken and postponement of definite action of any kind at least until the results of the Massachusetts experiment are in. It is pointing out the various strong arguments against compulsory automobile liability insurance now so well known to most executives who have studied the problem in the last few years. Its position in general is pretty well expressed in the following excerpt from a statement issued recently by the National Automobile Chamber of Commerce:

"The National Automobile Chamber of Commerce is squarely opposed to compulsory liability insurance, and has been for the past several years. The reasons why it opposes this insurance are many. Compulsory insurance will not reduce the number of accidents for the reason that nobody is going to be careful just because he carries a policy of insurance. There is much more reason to believe that the operator will be more careless because he knows he is insured, and that he personally will not be responsible for any monetary damages.

"Another very important argument against compulsory insurance is that there are no facts or statistics in existence which show the total amount of uncompensated losses due to motor vehicle accidents.

"In the absence of such figures showing the amount of uncompensated losses, due to motor vehicle accidents in any one state in the United States, it would be unfair for the states to impose an extra burden on the motorists in the form of compulsory insurance to cover an amount of uncompensated damages, which, when actually ascertained, might be comparatively small.

Will Increase Operating Cost

"Compulsory liability insurance will increase the cost of motor vehicle operation; will act as a great hardship on many thousands, and this is particularly true of the farmer-owner. The reason for this, of course, is that there is less congestion in the agricultural districts. The owners of motor vehicles in the United States are already paying $750,000,000 in the form of taxes which is expended for state and local highways. If the cost of compulsory insurance is added to this it will make the motorists of the United States pay a sum approximately amounting to $1,005,000,000 for the privilege of operating motor vehicles over the highways.

"In fact many persons may be deprived of the use of motor vehicles because of this added burden. Compulsory insurance will particularly affect the great body of owners represented by the farmers, and those depending on agricultural pursuits for their livelihood."

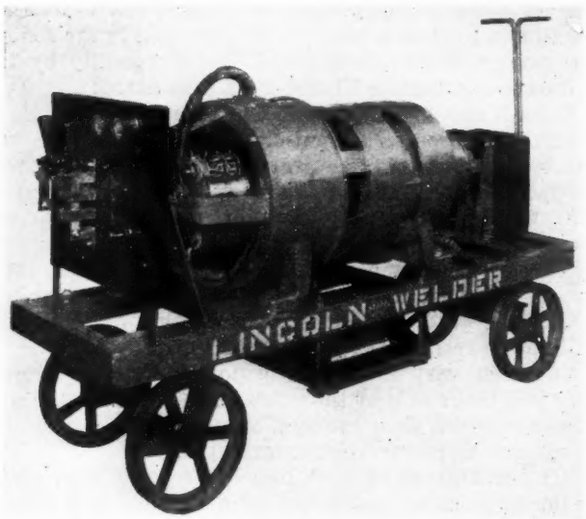
And there, for the present, it would seem, the case rests. Compulsory insurance is bound to be a major legislative consideration from an automotive standpoint in the next nine months and further developments will be watched carefully from every part of the industry.

NEW DEVELOPMENTS—Automotive

Lincoln Stable Arc Welder

IN its new 300-ampere, alternating-current power supply Stable Arc welder, the Lincoln Electric Co. of Cleveland, Ohio, is furnishing a portable electric welder in which there are only two gray-iron castings of an aggregate weight of about 15 lb. All other parts that are usually made of iron castings are here made of steel and welded together. Other sizes of the Lincoln company's line of welders are being changed to this "welded" type of construction.

The motor and generator end rings, brackets and connecting ring are all made of structural angles rolled up into the proper shape and welded together. The feet of the motor generator set are made of drop forgings.



Lincoln welded-steel, 300-ampere Stable Arc welder

The truck wheels are made of T-section rolled on a special machine. The hub of the wheel is made of steel tube. Control panels are usually made of slate or special non-metallic compounds, but the panel illustrated is made of sheet steel welded together and welded to the supports. Two advantages of the welded construction would seem to be reduced weight and greater freedom from liability to breakage.

New Brake Mechanism

RAYMOND DYMOCK, of Hamburg, N. J., has invented a brake mechanism which is illustrated by the drawing reproduced herewith. There are three brake shoes which cover equal arcs of circumference on the inside of the brake drum. Between the ends of adjacent shoes are located studs secured into the brake housing, which serve as points of anchorage on which the brake torque is taken up. Adjacent brake shoes are connected by toggle links, and from the joints of these links other links extend inward and connect to lugs on a ring having a bearing on the outside of the axle tube and having gear teeth cut over a portion of its circumference. With these teeth mesh those of a toothed sector secured to the brake shaft, which latter is supported in a bearing in the brake housing and

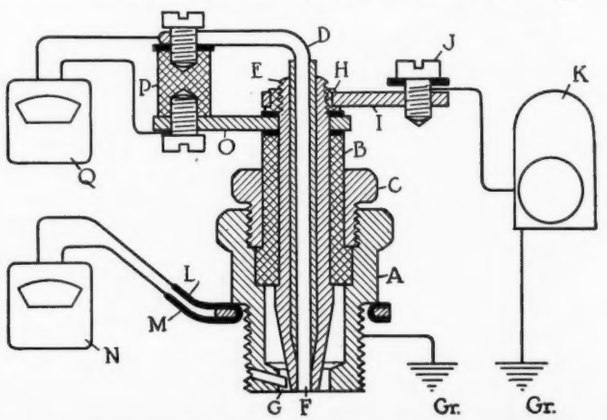
Dymock's brake design

at its outer end carries a lever arm to which the brake rod attaches.

Among the advantages claimed by the inventor are that the brake bears equally all around, that it requires a minimum of operating force, wears evenly and requires no adjustment. Another feature is that the brake acts equally in both directions, that is, for both forward and backward motion.

Thermo-Couple Pyrometer

A THERMO-COUPLE pyrometer for determining the mean gas temperature in the cylinders of an internal combustion engine was exhibited at the recent Physical and Optical Societies Exhibition in London by the Foster Instrument Co. of Letchworth. The chief use to which such a pyrometer would be put is the determination of the temperature stresses to which the cylinder walls and the valves and other parts therein are exposed. Since the insertion of a thermo-couple in the cylinder wall alters the conditions of operation, it has been proposed to make it take the place of the copper-asbestos gasket under the spark plug head, but experi-



Thermo-couple for internal combustion engine research

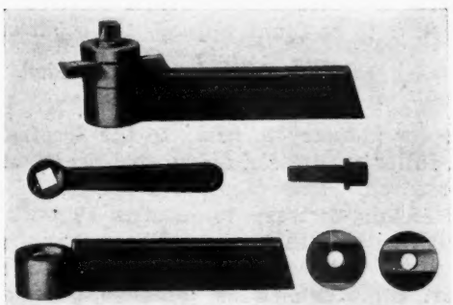
Parts, Accessories and Production Tools

ence is said to have shown that couples so placed indicate more nearly the temperature of the cooling water than that of the gas. The design of the Foster thermo-couple is as follows:

The spark plug body *A* carries an insulator *B* held by a gland nut *C*. The central electrode of the plug forms a concentric couple consisting of the wire *D* and sleeve *E*, insulated except at the tip *F*. The spark passes between *F* and a point *G*. The lug *I* on nut *H* is arranged to swivel, and the ignition lead from the magneto *K* is attached at *J*. The washer couple *L* and *M* is connected to an indicator *N;* the plug-couple connections to the indicator *Q* are made through the wire *D* and the lug *O* supported by the insulator *P*.

Both of the branches of the thermo-couple being on the high tension side of the magneto, the indicator must be highly insulated. The effect of the heat energy of the spark has been found to be very small, and to be balanced by the slight shrouding given by the body of the plug. Although the temperature measured by the thermo-couple will not be exactly that of the valve head or the center of the piston head, these temperatures will be of value. Thermo-couples in the walls of several cylinders can be connected to the same indicator.

Universal Tool Holder



Waukesha universal tool holder

A UNIVERSAL tool holder for lathes, planers, shapers and other machine tools has been placed on the market by the Waukesha Tool Corp., Milwaukee, Wis. With this tool holder it is possible to adjust the tool to practically any angle, for right hand, left hand or center cuts, without removing the tool from the holder or the holder from the tool post.

Moto Meter Spark Plug

A SPARK PLUG embodying several new ideas is being marketed by the Moto Meter Co., Inc., of Long Island City, N. Y. Its most striking feature consists in automatic adjustment of the length of the spark gap as the plug heats in service and cools down. Owing to the fact that when an engine is being started by means of an electric starter, the terminal voltage of the battery is materially reduced by the heavy current draw, it is desirable to have a narrower gap while starting, as otherwise a sufficiently hot spark to cause ignition may not be produced under generally unfavorable conditions, such as low atmospheric temperatures. In this plug the gap is set at 0.015 in. when the plug is cold, and as the plug heats up the gap automatically widens to 0.030 in.

The grounded terminal of this plug consists of a strip of bi-metallic material which follows the end of the outer shell for about 120 deg. and then turns radially inward, coming within 0.015 in. of the point of the central terminal when the plug is cold. When the plug heats up in operation, owing to the difference between the coefficients of expansion of the two metals, the free end of the grounded electrode swings around and increases the gap to 0.030 in., which is claimed to be more desirable in regular operation.

Moto Meter spark plug

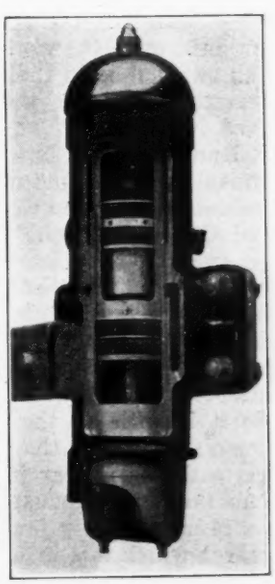
The central electrode of this plug is made of a nickel alloy having good heat and rust-resisting properties. The insulator, instead of being of ordinary porcelain, is made of a ceramic material which has been specially developed for such purposes and which is claimed to be of high dielectric strength, non-porous, of high heat conductivity and of great mechanical strength. The shell and gland nut are described as having an anti-rust finish.

To facilitate the setting of the spark gap to 0.015 in. when cold, a gage is furnished with each plug; it is conveniently placed under the terminal nut of the plug and can be easily detached and replaced. The terminal post has two continuous thread sizes and any type of terminal nut can be used with it.

These spark plugs are made in 12 combinations of threads and sizes to suit all makes of car.

New Gruss Air Spring

THE Cleveland Pneumatic Tool Co., which was recently merged with the Westinghouse Air Spring Co., announces a new Gruss air spring designed for use on trucks of from 5 to 7 tons, capacity. The cylinder has a bore of 4½ in., the largest bore ever used in devices of this kind, and the range of piston motion is 6 in. Using a comparatively large cylinder bore permits of the use of less air pressure, and this is claimed to give better cushioning against road shocks. The new model, which has a piston head area of 16 sq. in. and a bearing area of 164 sq. in., is known as the Mogul.



Gruss Mogul air spring

Who's *to be* Who *in* Original Research *of the Future?*

Interesting question raised by J. H. Hunt in addressing Penna. Section S. A. E.

WHO, in coming years, is to carry on the work of such men as Crookes, Roentgen, Heavyside, Pupin and the many others who have torn the veil from some of Nature's secrets and thus made available to civilization knowledge which has been of incalculable value? There are, apparently, well-organized means of experimenting with known facts so that all possible combinations and applications of them are brought to light, but who is to bear the responsibility of seeking those of Nature's secrets which are still unknown but which may contain bounties for civilization of greater value than any we now possess?

This was the question left in the minds of those who listened to the talk given by J. H. Hunt before the February meeting of the Pennsylvania Section of the Society of Automotive Engineers and the discussion which followed, and is a question of particular importance to all members of the automotive industry.

Although it is not commonly considered, it is nevertheless true that the entire automotive industry has been built upon the work of men who had no thought of an automobile in their minds, but who were solely interested in solving the eternal Why of things perceived in Nature. The internal combustion engine, Mr. Hunt stated, is based on work done with hot air engines and this, in turn, was suggested by results obtained by men who wondered why air, when heated, acted the way it did. The history of the electrical science is too well known to need any comment but it was brought out that the present efficient electrical systems have been made possible only by the gropings into the unknown of "professors" who, in many instances, were considered just a bit cracked because of their pertinacity.

So it is with all the elements which make up an automobile. While the actual application of knowledge to the particular job in hand has nearly always been a task which industry has taken over itself, there have been relatively few instances where the type of research which this involves has led to quite new conceptions of natural phenomena. The universities of the world have, in past years, been the places whence trips into the unknown have been launched. Today, in the United States, at least, there appears to be a doubt whether our universities can continue to carry this burden.

From a commercial standpoint, the immediate value to a particular industry of a new scientific fact is usually less than the application of this fact in the development of salable goods. Thus, it was agreed, industry is more interested in this matter of application and combination of known facts than in the discovery of new bits of knowledge. Competition has made it necessary, apparently, to devote the best available scientific minds to this work of application with the result that many of the persons who are ably fitted to carry on original research work have been lured by much greater compensation and by better working facilities from the work of pure science to that of making commercial applications of science.

The question now arises, How long can this continue without materially affecting world progress? Granted that we may have only scratched the surface of possibilities in those things which are now known, it still appears to be true that unless there is a constant and more or less systematic effort to delve still further into the unknown there will come a time when progress must cease. Many scientists have made statements concerning the almose unbelievable quantities of energy which are contained in an atom and it appears that if only some way might be discovered to release this energy and put it to work the world would take a greater upward stride than ever before. Many minds are laboring with this problem now but if more and more of those best fitted to seek the solution are turning their talents to other work of more immediate possibilities, the time when the solution is to be found appears to be put still farther off.

"Star-Gazing" Needed

What appears to be needed, in Mr. Hunt's opinion, is for industry to bring to the forefront of its mind a fuller realization of the real practical value of pure research. This requires a species of "star gazing," a looking-forward to returns 10 or 25 years hence rather than this year. The automotive industry is fully alive to the value of that phase of research which Mr. Hunt defined as "planned experimentation" because it is directed toward ends which, when arrived at, mean more profitable operation. But compare the real value of the most important of these researches with that of the work upon which the electrical science, for example, is built and the "planned experimentation" becomes almost negligible in value. It is necessary work and it is extremely advantageous to civilization that so much has been accomplished and will be accomplished in applying pure science to commercial purposes. But this work is based on probings which, apparently, have no immediate commercial value and so pure research has not always gained the support from industry to which it is fully entitled because of its real practical value.

Those taking part in the discussion thought it would be desirable to have less commercial research done by universities since this work can be performed quicker and better by industry, and the universities should be helped by industry in placing more emphasis upon original research not only because of the possible value of the results but because of the better preparation such work will give to students for following up any particular branch of the work for which they are best fitted.

Just Among Ourselves

Edison's Respect for Accurate Thought

READING the answers made by Thomas Edison to questions put by newspaper reporters on the occasion of his 80th birthday, provided as pleasant and interesting a half hour as we have had in a long time. The fundamental modesty of the truly great is vividly impressed upon one by reading Edison's statements. The electrical wizard answered definitely and unhesitatingly those questions on which his particular experience and knowledge enabled him to speak with authority; he was just as quick to admit ignorance and quite definite ignorance of things which he knew he did not know. His replies, even though rapidly made, exhibit a most scrupulous regard for accuracy of thought and for the opinion of others. Not only may the great scientist's achievements continue to warrant our highest homage, but his mode of thought also may well be taken as a most excellent pattern for emulation by us common people.

* * *

"Never Thought About it; Can't Answer"

DO you believe in the naval reduction plan?" Edison was asked. "Haven't thought enough on this line to give an opinion worth anything," he replied. "How could Henry Ford best dispose of his great fortune to benefit mankind?" "Never thought about it; can't answer." For us there is a whole sermon in those few words. "Never thought about it; can't answer." . . . . . But some of the questions had very considerable industrial, and indirectly automotive, significance. Edison does not look for any radical change in the present system of generating and distributing electricity unless we solve the problem of cold light. "I cannot see with what we know at the present time that it will ever be practicable to transmit power without wires," he said in reply to another query. He does not believe, moreover, that radio will supersede wire telegraph and telephones. Questioned on the five-day week, he said: "As the introduction of automatic machinery becomes more general it will be compulsory to prevent overproduction with all its evils."

* * *

Ford Also Put on the Grill

HENRY FORD, visiting Edison on the latter's birthday, also made some interesting statements in reply to questioning. He hasn't devised a plan for the disposal of his great fortune, he said, but he "has an idea" what he will do with it. Asked whether aviation will ever do away with automobile transportation, he said he just wondered. "We keep up with the development, of course," he said. "I've never flown and I never expect to. But we build machines and will keep up the developments. Airplanes can operate now only when subsidized. We're flying between Detroit and Chicago every day now; but we're subsidizing our aviation."

* * *

Monkey Wrench for the Nuts

I JUST came from a meeting of the Society of Automotive Engineers," C. F. Kettering said at a meeting of the Michigan Automotive Trade Association recently, "and the president opened the meeting with a monkey wrench; that was because there were so many nuts present."

Factories Cutting Down Expenses

THESE are corner cutting days in a good many automobile plants. Car makers have seen their margin of profit per unit going down steadily for some time past. They don't see much chance, owing to competitive conditions, of increasing that margin by actual price increases. Some of them have made up their minds to strive valiantly to maintain present price levels, however strenuous competition may become, and to bend every effort toward increasing the profit margin per unit through even greater efficiency within the plant. In other words, they are planning to work toward the same ends as in the past, with the difference, however, that a large proportion of future savings will be kept to make the profit per unit sufficiently large to be safe and to keep the balance sheet from dipping into the red at the slightest waiver of material prices or prospect of dip in the general business curve.

* * *

Less Elaborate Dealer Entertainment

ONE evidence of a trend toward economy was indicated by the relatively less elaborate character of a number of the dealer dinners this year during the National Shows. The chief executive of a big producer in the middle-priced field, for example, told us the other day that he had known the time when his organization had spent $20,000 on a single dealer dinner. Such an expenditure he considered wasteful from several standpoints, since to his mind it not only was extravagant, but also failed to aid materially in getting dealers into a better frame of mind for selling.—N.G.S.

New Ingersoll Machine Bores 30 8-Cylinder Blocks Per Hour

Feed is controlled by Oilgear unit which produces cyclic operation. Company has also developed rapid-production milling and drilling machines which embody new features.

MACHINE tools built by the Ingersoll Milling Machine Co., Rockford, Ill., are widely used in the automotive industry. This concern, as a rule, builds specialized equipment for specific jobs, but its most recent designs have several features in common, including hydraulic feed, inclosed electric drive, and facilities which reduce handling effort, speed up production and aid in the disposal of chips. These latest milling, drilling and boring machines are characterized by great weight and rigidity, and the fixtures and work-holding devices possess the same features.

Fig. 1 shows the latest Ingersoll multiple-spindle cylinder-boring machine which bores 30 eight-cylinder blocks per hour. Tolerances of 0.001 in. are maintained on the cylinder center distances, parallelism and trueness of bore. Ordinarily this machine is set so that the flat table in front is level and in line with a roller or slide conveyor. The block first is slid on to this table and then rocked back into the depression directly below the boring bars. Within this depression are hardened guide bars and dowels for the correct location of the block, and clamping is accomplished by the facilities shown. Locating dowels are drawn down out of the way during the loading and unloading periods by the hand lever mechanism shown at the front of the machine.

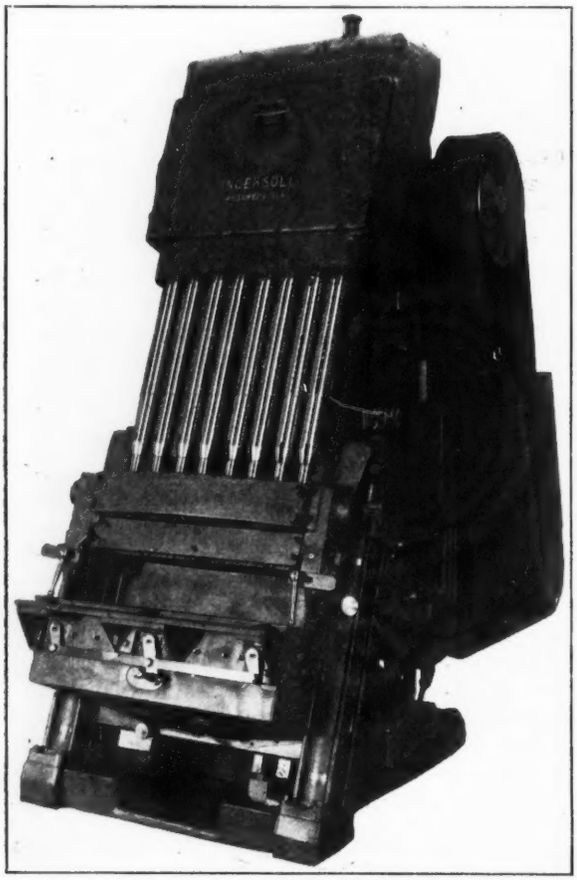


Fig. 1. Inclined cylinder boring mill

While the main drive of the machine is from an electric motor at the back, feed is controlled by an Oilgear unit which produces cyclic operation. As the operator trips the button at the front of the machine, the carriage rises rapidly until the boring bars are about to engage the cylinder barrels. Automatically the feed slows down to the working rate, which also is comparatively high. At the completion of the boring operation, the carriage descends rapidly to the original position and stops there automatically for the repetition of the cycle. With hydraulic feed of this type, the rate of feed can be pushed to the limit, as safety devices incorporated in the design insure against tool breakage in case of any unusual obstruction.

Milling Ends of Main Bearings

Another machine which is designed for the milling operation at the ends of main bearings and fits into similar conveyor lines is shown by Fig. 2. The block is moved from the conveyor on to the table and clamped by the bar and hand levers shown near the top. A hinged stop, which swings out of the way for transfer to the next operation, also shows. The cylinder is not rocked or turned over, but is processed just as it approaches the machine. In this case, too, hydraulic feed is utilized to feed the carriage with the block down toward an assembly of cutters which in the photograph is hidden by the front of the carriage. A similar cycle of operations occurs, so that the operator has only to unlock the holding device and slide the block on to the conveyor again. The production rate is 35 blocks per hour. By feeding the block down toward the cutters, chip disposal is simplified, all chips dropping down the chutes shown to a pan or pit at the front of the machine. The production rate is still further increased by double end drive for the cutter arbor.

Fig. 3 shows a multiple-spindle drill press for cylinder blocks, which incorporates 52 spindles in vertical and horizontal planes. Loading facilities follow the same general scheme as on the machines already described. The block arrives at the extension ways at the front and is slid back against hardened stops; it is located by disappearing dowels and finally is clamped by the handwheel. Cyclic operation in this case is secured by magnetic control. The control panel is inclosed and located just ahead of the Oilgear unit, while the control lever

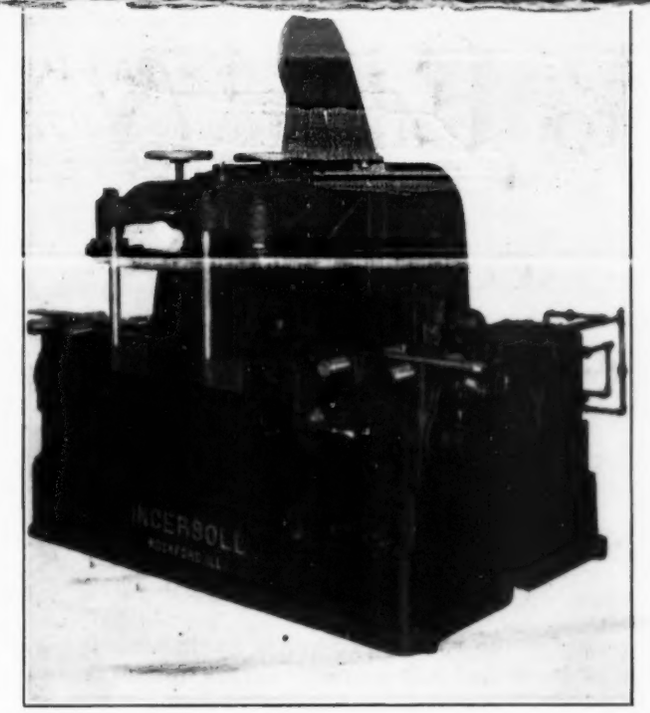


Fig. 2. Cyclic hydraulically-fed machine for milling ends of main bearings

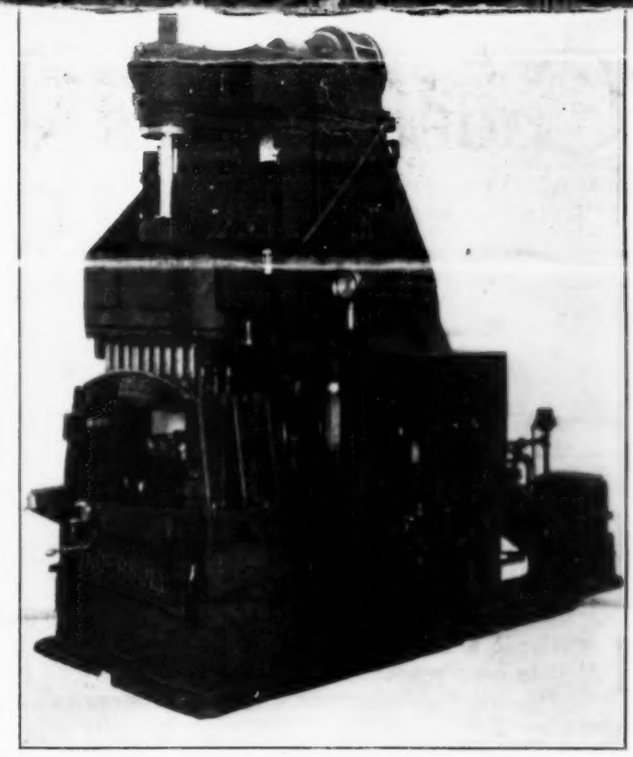


Fig. 3. 52-Spindle drill press with rugged simple loading provisions

which starts operations is placed convenient to the operator at the front of the base. In this case also the production is 35 per hour.

An entirely different type of machine, a five-spindle drum-type continuous miller, is shown by Fig 4. Both top and bottom surfaces of six-cylinder engine blocks are roughed and finish milled at the rate of 19 blocks per hour. The heavy construction with full inclosure of all mechanical components is apparent, as is the unusual amount of oil piping. With the drive motor at the top, the drive is carried down through inclosures to the 60-in. worm wheel which drives the drum upon which five fixtures are mounted. Chips are carried away from the loading side of the machine by a chute-like surface which is incorporated in the design of the base. The direction taken by the chips on leaving the cutters is controlled by individual guards which are part of the design.

INSURANCE companies in England state that owing to the large number of claims being received in respect of cars of less than 15 hp., the question of higher premiums for light cars is being revived. The great majority of light-car owners drive themselves, and a large proportion of these have had no other experience of driving.

Low rates of approximately £1 per hp. were assessed originally for small cars because it was thought that owner-drivers would treat their cars with particular care.

The insurance companies find that it is the larger cars that are less often subjects of claim. This is probably because they are operated carefully by experienced chauffeurs who would jeopardize their job by an accident. The raising of insurance premiums in respect of small cars, therefore, should have its reflex in an increased demand for the roomier and more powerful American automobile.

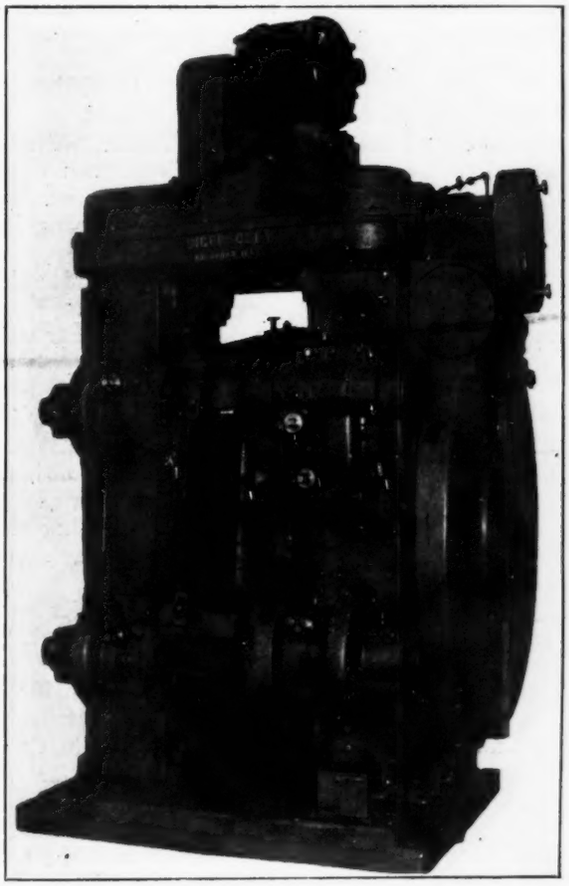


Fig. 4. Continuous rotary milling machine which rough-and-finish-mills top and bottom surfaces of cylinder blocks

Cadillac Puts Into Effect *New Standard* Service Policy

Car owners taking delivery after February 1 assured unusually liberal and uniform treatment in service matters at all authorized Cadillac stations.

By John Cleary

UNDER a new "Standard Service Policy" which has been worked out by the Cadillac Motor Car Co., all Cadillac owners taking delivery of new cars after Feb. 1, 1927, are assured unusually liberal and uniform treatment in matters of service at authorized Cadillac service stations throughout the country. Among the features of the policy are:

1. Extension of factory responsibility, as regards the replacement of parts defective in materials or workmanship, to a time far beyond the legal period established in the standard warranty of the National Automobile Chamber of Commerce.
2. Such parts to be replaced immediately, free of all material and labor charges, at the discretion of the distributor or dealer, without applying to the factory for approval. The factory to furnish the parts free, and the distributor or dealer to furnish the labor or installation free.
3. Every distributor and dealer to render the same prompt service, including the replacement of parts, regardless of where the car was purchased.
4. Complete reports to the factory on corrective or other work done on receipt of car by distributor or dealer, on its delivery to original owner, during the three months' policy adjustment period and during the longer term of the service policy agreement, thus furnishing the factory with a detailed history of each car shipped after Feb. 1, 1927.
5. Consolidation of the factory service and parts divisions into the Service Department, to coordinate sales and service more closely.

The new policy was worked out with scientific thoroughness by Nicholas Dreystadt, general service manager, and went into effect throughout the Cadillac distributor and dealer organization on Feb. 1. Many of its stipulations had previously been tried out for several months at a number of strategic points.

Operation of the new policy begins with the receipt of the new car by the distributor or dealer. He is required to have the car thoroughly inspected upon its arrival, see that it is properly lubricated, cooling system filled, given a test, conditioned, and made ready for the road. The condition in which the car is received and any corrective work found necessary are to be reported to the factory within five days, even if the car is placed in storage.

Before delivery to the purchaser, the car must be thoroughly washed, polished, cleaned inside, and gasoline tank filled, without charge to the owner. These items are included in the delivery allowance which is made to the distributor—and through him to the dealer—by the factory.

At the time of delivery, the buyer is instructed in the operation and care of the car, and appraised of the contents of the Operator's Manual, which is handed to him, instead of being packed in the tool compartment. He is made acquainted with the importance and use of the carburetor enriching device, inflation and care of the tires, correct lubrication, care of the battery, care of the finish, operation of all locks, and the use of all principal tools. The tool equipment is checked in the customer's presence, and his signature obtained on the delivery record and release. The factory recommends the introduction of the service manager, or his representative, to the customer, who is urged to bring his car to the service station every 1000 miles, or once a month, for inspection. The conditions of the Cadillac standard service policy are fully explained to him.

Each Cadillac car shipped from the factory now carries two detachable delivery report cards, giving the name and address of the buyer and the date of delivery. The distributor or dealer mails one of these cards to the factory the day the car is delivered. The other card is given to the owner with the keys, with instructions to mail it to the factory promptly.

Owner Gets Service Card

Upon receipt of both cards, the factory mails to the owner a "Service Card," on which appear the engine number, delivery date, owner's name and address, and the name of the selling distributor or dealer. The card carries the signature of the general service manager at the factory, and when it is signed by the owner in the space allotted for that purpose it becomes an agreement between the Cadillac Motor Car Co. and the owner.

When the owner receives this card, he is impressed

with the two outstanding features of the new standard policy.

First, the car entitles him to uniform service from any authorized Cadillac service station anywhere, in accordance with the terms of the new service policy. If an owner intends starting on a trip immediately on delivery of his car, and before the "Service Card" reaches him from the factory, the distributor or dealer will give him an identification letter, entitling him to such service until his card is forwarded to him.

Second, the policy extends the responsibility of the factory to replace parts defective in material or workmanship to a period of time greatly beyond that of the legal period of 90 days set by the standard warranty of the National Automobile Chamber of Commerce. During this time, provided the car is still in the hands of the original owner, and provided its mileage has not exceeded a reasonable figure, such replacement parts will be furnished and installed free of all charge to the owner.

And the distributor is the sole authority in deciding when defective parts can be replaced without charge. He will secure credit on such parts as soon as he applies for it. Complete confidence is placed in the distributor to interpret the policy correctly and effectively, so as to gain the owner's good will.

As Mr. Dreystadt points out, distributors and dealers have at their disposal the means for immediate settlement of any complaint involving the replacement of defective parts. A customer whose complaint can be quickly and definitely adjusted is satisfied without much difficulty. But even a minor matter left unsettled, and allowed to drag out through weeks and months of correspondence, makes an impression that is permanently unfavorable.

When such a replacement is found necessary, at a time when the owner is using his car in some territory other than his own, the distributor or dealer in that territory is authorized to render the same service without cost to the owner. The factory will stand the cost of the part, and the distributor or dealer will send the labor bill to the factory. The factory, in turn, will see that the distributor or dealer who did the work is reimbursed by the distributor in whose territory the car belongs.

All tests and inspections which do not require dismantling of units are made free of all charges.

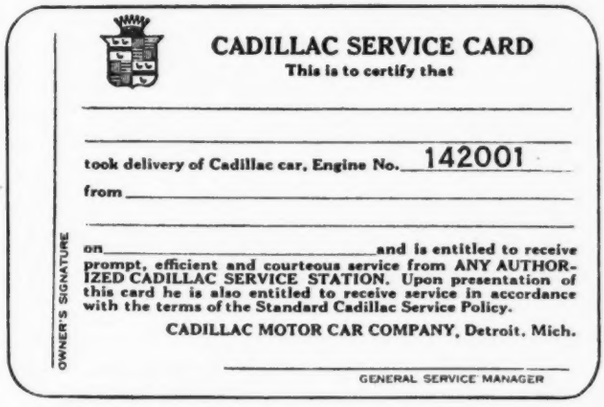
All adjustments, other than those made necessary by neglect, accident or abuse, are made free of all charges if such work is necessary, within 90 days after original delivery, provided the mileage of the car does not exceed 3000, the car is in the hands of the original owner, and the work is performed by a Cadillac distributor or dealer.

Special provision is made in the policy for the failure of the finish on painted, enameled or nickeled parts, when this happens through no fault of the owner, while the car is in the hands of the original owner. If it is reported before three months after delivery of the car, the factory will pay all reasonable refinishing cost charges. If it is reported after three months and before six months after new car delivery, the factory and the distributor or dealer will share the refinishing cost charges 50-50. If it is reported after six months and before a year after new car delivery, the factory will pay one-third of the charges and it requires that the distributor or dealer shall pay at least one-third, with the recommendation that the owner should pay the remainder.

In the case of parts finished in Duco, the factory, under the same conditions, will stand the entire cost of necessary refinishing reported any time within 12 months after delivery of the car.

All work during the first three months—or first 3000 miles— is to be entered on a "Policy Adjustment Report" and mailed to the factory immediately at the expiration of the policy adjustment period. This includes any work which may have been done by another distributor or dealer.

On a card at the factory will be entered the New Car Inspection Report and the Policy Adjustment Report. From time to time, other information, such as parts replacements and other work, will be entered on this card; it will thus become a history of the car, and the Cadillac Motor Car Co. will have such a history of each car that is delivered to an owner.


CADILLAC SERVICE CARD

This is to certify that

_____

_____

took delivery of Cadillac car, Engine No. 142001

from _____

_____

on _____ and is entitled to receive prompt, efficient and courteous service from ANY AUTHORIZED CADILLAC SERVICE STATION. Upon presentation of this card he is also entitled to receive service in accordance with the terms of the Standard Cadillac Service Policy.

CADILLAC MOTOR CAR COMPANY, Detroit, Mich.

_____

GENERAL SERVICE MANAGER

OWNER'S SIGNATURE

Card which entitles car owner to uniform service from any authorized Cadillac service station anywhere, in accordance with the terms of the new standard service policy

In formulating this policy, Mr. Dreystadt explained, the interests of the owner, the distributor and dealer and the factory are duly considered. The owner is given first consideration, because upon his satisfaction depends the success of the other two organizations. Next to the interests of the owner are those of the distributor and dealer.

The policy puts every Cadillac owner on an equal footing with every other Cadillac owner. The service will be the same everywhere, thus removing the disadvantages of the hitherto existing system, whereby the character of the service is dependent on the distributor or dealer, who can materially affect—whether for good or ill—the value of the buyer's investment in his car. It eliminates the chances that an owner will not get satisfactory service from his car when away from his home town.

On the part of distributors and dealers, Mr. Dreystadt continued, it will create a stronger feeling of confidence between the buyers and themselves. It will make for greater satisfaction among their customers. It will give them the benefits of nation-wide experience in the most satisfactory methods of delivering and servicing cars. It will make each distributor and dealer a unit in a cohesive organization.

From the factory viewpoint, the new policy will furnish invaluable data on the condition in which new cars are received by distributors and dealers, and their performance in the hands of owners. This information will be incalculably helpful to the engineering, production, shipping, sales and all other departments at the factory.

Swing of Business Toward the Parts Makers is Growing

Car builders depending more and more on equipment industry for engines and other supplies and announcement of several large contracts may be expected soon.

DEVELOPMENTS favorably affecting the unit parts makers in 1926, which were summarized recently in *Automotive Industries*, are likely to pale into obscurity beside the much more profound changes in automobile manufacturing scheduled for the current year.

Although advance information of this character is necessarily confidential, it can be authoritatively reported that the movement in favor of the equipment industry that started last year is rapidly gathering strength and momentum, and that further definite announcements of large equipment contracts may be expected before long.

The changing attitude of both the public and the car manufacturer, which is accompanying and stimulating the trend in favor of the parts maker, is part of an evolutionary process in the industry that goes back several years for its inception.

When makes of motor cars were much more numerous than they are today, and when many equipment items made by independents were completely standardized, there developed difficulties in selling cars that were purely assembled. A standard make and model of part, for example, was in several cars at various prices and buyers were too often urged to make their choices on a price basis that was unfavorable to some of the manufacturers.

There arose, therefore, the practice of ordering a special design of part that the car manufacturer could, in a manner of speaking, appropriate as his own. This did away to an extent with the economies of standard production by the parts maker and raised the prices to the car manufacturer. Even this condition has been obviated, however, and car makers are now able to refer to parts as of their own design without paying a large premium for the privilege.

So far is the industry from regarding these conditions as temporary that much of the new business being done is on contracts covering several years, which have the effect of spreading any unusual expenses incurred in connection with them.

For a personal view from an authoritative source of the improved position in which equipment makers find themselves today, the ideas of W. R. Angell, vice-president of Continental Motors Corp., are especially interesting. He was sought for an expression and what follows is largely in his own words.

This is the situation today as it confronts practically all of the large automobile companies:

1. Machine tool equipment, representing an enormous investment, is applicable to and arranged for existing models and engine sizes and to a very large extent is of the single purpose type.

2. In many cases, the existing machine tool equipment and engine building facilities are now fully utilized to take care of existing models and sizes.

3. Changes necessary to include a different size or type of engine would not only mean a large investment in machine tools, buildings and other facilities but would perhaps mean a substantial shop rearrangement with a consequent serious interruption of current production.

4. Competition is forcing all automobile companies, regardless of the size or standing of their respective engineering departments, to call in specialists in order to better their product.

From this it will be seen how the engine builder who has made a specialty for years of designing and building engines and of necessity keeping up to date with his product fits into this picture. His machine tool equipment is largely elastic because the models of engines which he is building are of wide range of sizes and types. He has large plants, extensive facilities and broad experience.

All engines and all cars today are good—they have to be or the cars would not sell, but some engines give just a little better performance and it is this slight superiority that the public seeks. Motor car users are beginning to discriminate. Hence the specialist is called in because he is supposed to know more about his particular subject than the general practitioner among automotive engineers.

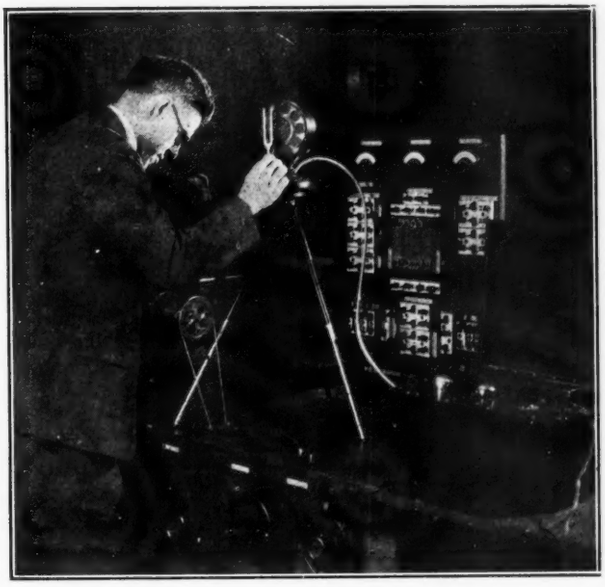
The price, of course, must be right, and parts makers must be prepared to sell their products at a price, including profit, substantially the same as that of the manufacturer who produces a similar type of engine in his own plant.

Further, having always been accustomed to turning out large quantities of different types of engines, the independent parts maker can get into production on a new model much more quickly than the average car manufacturer, thus enabling him to take care of new market requirements while the cream is on the demand.

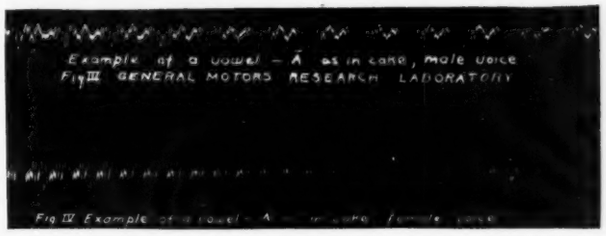
These observations of Mr. Angell reveal the position of the engine builders and the makers of some other important items of equipment. But what of the makers of various more or less standardized parts? There have been instances lately where car manufacturers have decided to discontinue turning out parts in their own plants to buy almost exactly the same product from an outside source. The considerations surrounding such changes are another story and a scarcely less interesting one, and it is going to be told one of these days.

Car Noises Are Photographed Through the "*Mike*"

Radio principles employed at General Motors laboratories in effort to trace unpleasant automotive sounds.



Apparatus which has been developed in the General Motors laboratories for recording sound by radiographs



The above radiographs show the possibilities of the sound recording apparatus. At the top is a radiograph of the waves produced by the sound of "a" as in cake, male voice. The same vowel from a female voice (at bottom) produces an entirely different set of waves

This is the way the word "car" looks in a radiograph

Here is an excellent example of noise, produced by striking a tin pan with a hammer. The radiograph shows how violent are the waves set up when the pan is struck, and how the waves gradually diminish as the vibration dies away

ILLUSTRATED herewith is an apparatus for recording sound which has been developed in the General Motors laboratories. Illustrated also are radiographic records of several different sounds. While in a general way the apparatus is founded on radio practice, ordinary radio equipment is not sufficiently accurate for this type of work and the units have been built specially.

In practice, the microphone which is shown on the tripod is placed close to the source of sound and connected by the usual two wire circuit to an amplifying tube assembly shown at the right. Here the slight pulsations developed by the microphone are amplified and delivered to the variable element of the oscillograph shown at the left. The latter unit is arranged with a timing device for photographic film which makes permanent records possible. The variable element in the oscillograph carries a small mirror which focuses a reflected beam of light on the film.

While the charts shown here record relatively simple sounds encountered in every-day life rather than noises encountered in automotive practice, the study of automotive noises is being carried forward. Although the apparatus records the wave form, intensity and pitch of the sound, difficulty in the study of automotive noise has been encountered due to reflected or "telegraphed" sounds which distort the record of the specific sound. At the present time, work is proceeding on methods of analysis and separation of the records arising from noise at various sources.

AMONG pyrometric terms recently defined by the Industrial Group of the Association of Scientific Apparatus Makers are the following:

Accuracy: In specifying the accuracy of a pyrometer the maximum error shall be expressed as a percentage of the full scale reading, or it may be specified as the maximum number of degrees of temperature.

Sensitivity: The sensitivity of a pyrometer is its susceptibility to small changes of the temperature being measured. Specifically, it is defined as the smallest change in temperature which will cause a variation of one millimeter in the reading of the pyrometer.

AUTOMOTIVE NEWS SECTION INDUSTRIES

Philadelphia, Pennsylvania

Saturday, February 26, 1927

February Production Gain Improves Quarter Outlook

PHILADELPHIA, Feb. 26—With January production totals showing an increase of approximately 45 per cent over December, and February promising to establish similar gains over its predecessor month, the industry is steadily approaching a production volume which bids fair to bring the first quarter within striking distance of output in the first quarter last year.

Registrations of new cars as reported from many states for January show Ford to be the principal sufferer from poor business. The extent of the Ford losses in many cases have brought registrations for the month to below the totals for January, 1926. Gains by other companies have held the totals to a favorable basis. In general the indication is that sales are being made of cars meeting public approval.

Practically all of the sales of the early year have been confined to the industrial districts except in the South and on the Pacific Coast where weather conditions have been more propitious for general sales. Probably the fact the farm districts are normally out of the market in the cold weather months has much to do with the reduced Ford showing. Whether the farm preference for Ford products will reassert itself with better weather and road conditions remains to be seen.

Used car stocks are not causing undue disturbance to factory sales or production plans. It is admitted that stocks of these cars in dealers' hands are somewhat larger than a year ago, but this is held due to the general increase of automobile sales.

Equipment Sales Show Sharp Gain

NEW YORK, Feb. 23—Big gains were shown in January shipments by members of the Motor & Accessory Manufacturers Association over December, although the level of business was slightly under the January, 1926, mark. Informal reports are to the effect that February shipments are continuing the gains made in January. The index figure for all groups in January based on January, 1925, business stood at 126 against 94 in December and 135 in January, 1926.

The most striking gain was in the original equipment group reflecting the prospective stepping up of passenger car and truck production. The index number for the equipment manufacturers stood at 132 in January against 95 in December and 140 in January, 1926. Accessories made a moderate gain the index number standing at 79 in January against 64 in December and 127 in January a year ago. Replacement parts show a minor decline with an index number of 107 in January against 109 in December and 103 in January, 1926.

Service equipment shipments not only bettered December but were well above the figures of a year ago, the index numbers being 140 against 112 and 115.

Percy Owen Heads Brake Shoe Company

NEW YORK, Feb. 23—Percy Owen has been appointed president of the American Brake Materials Corp., subsidiary of the American Brake Shoe & Foundry Corp., formed in September, last year, to manufacture and sell a brake shoe of new design and braking material for motor vehicles. General offices of the brake materials company will be in the Coe Terminal Building, Detroit, with factories on Merrick Ave., that city.

Manufacturing operations have been transferred to Detroit following a recent fire which destroyed the company's factory at Lancaster, N. Y., in which preparations had been made for manufacture. Equipment is now being installed in the Detroit plant and manufacturing will begin in the near future.

Mr. Owen is best known in the industry through his connection as chief of the automotive division of the Department of Commerce and as president of the Liberty Motor Car Co. Recently he was director of export sales for Dodge Brothers, Inc., resigning last year.

Briggs-Murray Merger Waits Final Proposals

NEW YORK, Feb. 24—Directors of the Murray Corp. of America did not discuss formally the possibilities of a merger with Briggs Mfg. Co. at their meeting this week, according to W. R. Wilson, chairman of the board. Overtures looking to such action have been taken, Mr. Wilson said, but no concrete proposals have been made for directors to consider.

PRODUCTION GAINS 44% IN JANUARY

WASHINGTON, Feb. 21—Total production of passenger cars and trucks in the United States and Canada for January was 249,506 according to tabulations by the Department of Commerce. United States production was 196,973 passenger cars and 37,157 trucks; Canada passenger cars were 11,745, and trucks, 3631. Combined production for the two countries represented an increase of upwards of 44 per cent over December.

Totals for January, 1927 and for the months of 1926 follow:

1926

	Cars	Trucks	Total
Jan.	284,703	33,517	318,220
Feb.	334,524	41,784	376,308
March	399,105	49,386	448,491
April	401,836	54,135	455,971
May	394,569	51,568	446,137
June	358,388	47,265	405,653
July	329,959	41,873	371,832
Aug.	393,064	47,836	440,900
Sept.	363,547	51,257	414,804
Oct.	300,160	46,985	347,145
Nov.	226,278	39,430	265,708
Dec.	143,413	30,161	173,574
Total	3,929,546	535,197	4,464,743

1927

	Cars	Trucks	Total
Jan.	208,718	40,788	249,506

Industry Assumes Ford Planning Small Six Car

DETROIT, Feb. 24—Though no additional details on the new Ford car are obtainable from Henry Ford or members of the Ford organization, it is assumed in the industry that Mr. Ford in his recent statement regarding a new model was referring to a new small six and not to a remodeling of the present Model T which is thought to be now underway.

The Model T changes, though believed to be extensive as to detail, are not such as would justify its being called a new model. The industry, therefore, infers that Mr. Ford is promising a small six for appearance some time later but finds this somewhat difficult to reconcile with the repeated public denials by the company.

Falcon Names 5 Dealers

DETROIT, Feb. 23—Names of dealers in five major cities of Falcon Motors Corp. were announced this week as follows: J. W. Leavitt & Co., in San Francisco and Los Angeles; A. F. Schultze Co., Chicago; A. A. Bernard, Boston, and Lee Abrams, Inc., Buffalo.

Used Car Stocks Exceed 1926 Level

Curtailment of New Car Sales Seen Resulting Through Lower Appraisals

PHILADELPHIA, Feb. 22—Reports from distributors in leading centers give the used car situation an unfavorable cast and lead to the statement from several sources that early year new car selling will be curtailed in bringing used car stocks to workable proportions. According to the statements new car sales will be checked principally because dealers will decline trades except on new low valuations based on prices used car buyers are willing to pay.

Movement of used cars at present is costing dealers more than in other years, the reports indicate, and in addition to cost of selling dealers are also being obliged to accept prices lower than trade-in valuations had anticipated. The conditions outlined, though not applying to all districts, are sufficiently general to indicate that the country as a whole has more used cars than normal and that demand is below normal.

In practically all districts, however, some dealers report used car stocks in good normal condition with a buying volume at least in ratio to new car movement. Dealers selling cars in no one price class are overloaded particularly.

As a general rule, dealers are being aided in holding used car stocks low by reduced new car shipments from factories. In most instances where shipments are reported heavier than at the same period last year, this is because models added since early 1926 are included.

Reeves Reports Business Improved in February

NEW YORK, Feb. 23—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, back today from a trip to the automobile factories, declared that sales showed a pronounced upward trend during the early weeks of February. He said, however, there was some disposition on the part of the buying public to defer purchases in the hope of lower prices, in consequence of the widespread discussion of "fiercely competitive" conditions in the industry. The fact that prices have held steady is overcoming this condition and better weather should encourage purchasers of the new brightly colored cars, which owners are not disposed to run during unfavorable weather.

La France Net Lower

NEW YORK, Feb. 22—American-La France Fire Engine Co., Inc., for year ended Dec. 31, 1926, shows net income of $682,102 after expenses and taxes, equivalent after preferred dividends to 90 cents a share (par $10) earned on 449,300 shares of outstanding common stock. This compares with $830,863, or $1.50 a share, on common in 1925. Above earnings in 1926 are exclusive of $791,650 cash received from the government, representing rebates on Federal taxes paid in previous years, and also extraordinary charges amounting to $673,266 for engineering and developing expenses.

Ternstedt Honors Departing Chiefs

DETROIT, Feb. 24—A farewell dinner was tendered Paul W. Seiler, who recently resigned as president of Ternstedt Mfg. Co. to accept the appointment as president of Yellow Truck & Coach Mfg. Co., by 800 associates of the Ternstedt plant. T. P. Archer, new president, presided at the dinner. Telegrams of congratulation were read from Fred T. Fisher and Norval A. Hawkins. Capt. E. V. Rickenbacker was among the speakers.

The dinner also honored four other members of the Ternstedt organization who are going with Mr. Seiler in his new work. They are M. T. Boden, treasurer; D. E. Humphrey, general sales manager; Herbert Buelteman, director of purchases, and Ernest E. Heinz, engineer. The following members of the Ternstedt organization have been promoted to the respective positions; L. F. Fry, J. H. McPhail, Ted Sturgeon and Frank Edgar.

Pontiac Adds Sport Cars and Lowers Two Prices

PONTIAC, Feb. 21—Two new Pontiac models have been announced by Oakland Motor Car Co., a sport roadster at $775, and a four-passenger sport cabriolet at $835. New prices on the former models of the line have been made effective as follows: Sedan, $775 and coupe $775. Both the roadster and sport cabriolet have rumble seats.

Mechanical refinements include an improved clutch of smoother and more positive action and an oil-sealed universal joint. The new 17-in. steering wheel has a die-cast aluminum spider and the appearance and operation of the hand levers have been improved. Tilting beam headlamps with foot control, one of the features of the recent Oakland cars, now are standard equipment in all Pontiac models. The radiator has been made deeper. Larger headlamps blend with heavier, larger and more sweeping crowned fenders.

Earl W. McGookin

DETROIT, Feb. 24—Funeral services for Earl W. McGookin, long identified with the industry as a manufacturer's representative in the Detroit territory, were held this week. Mr. McGookin died Feb. 19 after a long illness. He was 48 years old and leaves a widow.

Business in Brief

Written exclusively for* AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Feb. 24—Trade in some branches was in somewhat smaller volume last week, partly because of severe weather in a number of sections. Certain basic industries, however, report increased activity. Conditions in the textile trades continue to improve. Railroad shares remained the center of interest in the stock market last week. Commodity prices declined, while money rates were slightly firmer.

FREIGHT CAR LOADINGS

Heavy coal shipments continued to be the principal feature of the car loading statement for the week ended Feb. 5. The total was 970,892 cars, which compares with 950,969 cars in the preceding week and 914,491 cars in the corresponding period last year. Freight traffic of Class I railroads in 1926 was the largest on record, amounting to 488,577,875,000 net ton-miles. This figure exceeds by 7.1 per cent the total for 1925 and by 6.8 per cent the previous record established in 1923.

PETROLEUM OUTPUT

A large gain in the production of crude petroleum took place during the week ended February 12, with an average daily output of 2,462,250 barrels, as against 2,402,400 barrels a week earlier and 1,902,500 barrels a year ago. Crude oil and gasoline prices were without important changes last week.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended Feb. 16 were 1 per cent larger than the total for the preceding week and 9.8 per cent above that of a year ago.

FISHER'S INDEX

Fisher's index of wholesale commodity prices stood at 142.1 last week, as against 144.4 a week earlier and 146 four weeks earlier.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve banks increased $36,500,000 during the week ended Feb. 16, with gains of $17,400,000 in discounts, $12,500,000 in open market purchases and $7,100,000 in holdings of Government securities. Note circulation declined $8,700,000, while deposits increased $75,300,000 and reserves $9,800,000. The reserve ratio declined from 79.5 to 78.4 per cent.

The call loan rate ranged between 3¾ and 4½ per cent last week, as against a flat rate of 4 per cent a week earlier. Time money was slightly firmer at 4⅜ to 4½ per cent, which compares with 4¼ to 4½ per cent in the preceding week. Commercial paper rates were unchanged at 3¾ to 4¼ per cent.

Canada Reduces Sales Tax on Cars

Reductions in Retail Price of 1 Per Cent Are Effective Immediately

OTTAWA, Feb. 21—Further relief from taxation, in a slight measure, is afforded automobile dealers and purchasers in Canada in the 1927 budget of the Canadian Government, presented by Hon. J. A. Robb, Minister of Finance, before the House of Commons, Feb. 18, in the cut of 20 per cent on the sales tax, which has been 5 per cent for some years past.

The announced reduction, which became effective immediately, represented a difference of slightly less than 1 per cent on the present retail prices of automobiles in Canada. It has really meant a retail price reduction of from $5 to $25 on popular cars, and the dealers immediately adjusted their prices accordingly.

The sales tax on automobiles in Canada is computed on the actual cost to the dealer, or, in other words, on the duty paid value plus freight and excise taxes.

Announcement is made that the reduction of 5 per cent in the sales tax does not apply to the dealers' profit, hence the ultimate reduction in the retail price was not quite 1 per cent of the current retail quotations.

Switzerland Increases Registrations to 72,214

LONDON, Feb. 15 (*by mail*)—Switzerland's automotive registration on Nov. 30 last was 72,214. In 1925 the total was 59,232 and two years earlier, 34,500. The 1926 aggregate includes 38,049 passenger cars, 7870 trucks and 26,239 motorcycles. The Republic's saturation point is put at 100,000 automotive units.

Switzerland depends almost entirely on imported passenger cars, as only 7 per cent of these vehicles in use are of home manufacture. Against this, 50 per cent of the trucks are of domestic make.

The value of Swiss automotive exports in 1926 was $874,000, while imports amounted to $16,060,000.

German Maker Seeks Parts

WASHINGTON, Feb. 23—Abandonment of four-cylinder cars in favor of an eight-cylinder type is announced by the Horchwerke A.G., Zwickau, Germany, in advices to the U. S. Department of Commerce this week. The company is interested in purchasing parts from American manufacturers, including crankshafts, bearings, electrical equipment and similar parts. The present production schedule of the company calls for six to eight cars a day, which will be increased to 10 a day this month and to 20 a day in May.

MORRIS TO BUILD PLANT IN SPAIN

PHILADELPHIA, Feb. 21—A plan is under way in Spain looking to the creation of a national automobile industry on a new basis, with the cooperation of a British firm, which has been accorded permission to enter the necessary machine tools and parts du y-free. The Spanish Government will give this British firm a first order for 300 cars. The beneficiary of this special enactment, however, is compelled to install in its plant in Spain the necessary equipment to enable it to manufac ure there the parts which it imports from England at the start. According to *Dimanche-Auto*, the British firm concerned is Morris.

De Dion-Bouton Halted by Lack of Finances

PHILADELPHIA, Feb. 21—Serious financial difficulties have been encountered by the De Dion-Bouton Co., one of the oldest in the French industry, which on Jan. 12 stopped payments. Only a month earlier it was reported that the firm was to be amalgamated with that of Peugeot. M. Rosengart, who conducted the negotiations for the amalgamation, had received the consent of the majority of the creditors to a settlement on the basis of 75 per cent, extended over a period of three years.

This provisional arrangement enabled the firm to get over the critical period of the end of the year, but later it was found that the capital necessary to carry through the arrangement could not be obtained and hence the plan of combining with Peugeot has been dropped. Practically the whole of the working force at the Puteaux plant has been let go.

N.A.C.C. to Study Means to Meet Export Problems

NEW YORK, Feb. 23—Members' meeting of the National Automobile Chamber of Commerce, March 3, will be featured by discussion of the prospects and problems of foreign trade, in which export managers will participate as well as the heads of their companies. Special attention will be given to means of bringing down costs of landing cars and trucks in foreign markets, and consideration will be given to the trend in foreign taxation, to foreign financing, and to publicity campaigns abroad against purchases of American goods.

Among the general topics to be taken up by the members will be means of assisting local agencies in overcoming traffic congestion and means of obtaining better registration figures from the states. In the afternoon there will be a meeting of the motor truck members of the chamber. The directors will hold their regular monthly meeting March 2.

Congress Considers New Bus Measure

Would Give States Federal Power Over Vehicles Operating Between States

WASHINGTON, Feb. 24—The right of any state to regulate interstate traffic by automobile bus and the advisibility of Federal regulation of such traffic are under consideration by the House Committee on Interstate and Foreign Commerce, which this week opened hearings on the bill (S.3894) providing for regulation of buses operating as common carriers through the interstate tunnel now being constructed under the Hudson River between New York City and Jersey City, and over the interstate bridge across the Delaware between Philadelphia and Camden.

The bill would delegate Federal authority to the state agencies of New York, New Jersey and Pennsylvania now regulating bus traffic within the states, to regulate interstate traffic over the two routes. The measure is being attacked by representatives of the bus and truck business who fear that the measure will become an entering wedge for further legislation of the kind.

Called Traffic Regulation

Harold S. Shertz, representing the motor bus operators of Philadelphia and vicinity, pointed out that the Interstate Commerce Commission has recently conducted a comprehensive investigation of the interstate motor bus transportation situation and recommended that the committee await the filing of its report before taking action. He opposed the bill as a means of regulating traffic, not commerce, which, he declared should be left to the states.

Franklin Names Dealer to Handle British Sales

NEW YORK, Feb. 21—The Franklin Motor Co. of England, has been incorporated to handle Franklin automobile sales and service in England, Wales, Scotland and Ireland. The main showroom and service depot will be maintained at London, while a branch will be opened in Edinburgh. A. J. T. Taylor, chairman of A. Johnson & Co., ship owner, is president. John Anderson is managing director, while H. Edmond Plaister, well known English automobile racer, is London manager.

Mr. Taylor made a trip to the Franklin factory at Syracuse late in January to familiarize himself with the executive organization and the details of manufacture of the Franklin car. Service men from the London and Edinburgh branches will be sent to America within the next few weeks to study the manufacturing processes, and managerial control of repair and maintenance work as outlined by the Franklin system of standardized service.

Millspaugh & Irish Buy Mid-West Plant

Will Transfer Major Operations to New Plant and Increase Output

INDIANAPOLIS, Feb. 19 — Millspaugh & Irish Corp. has bought the main plant of the old Mid-West Engine Co. and will employ it to increase production of automobile bodies here. The company in an expansion plan recently set up a branch plant in Detroit, and the added facilities acquired here will permit a greatly increased local production.

In the absence of both Harry B. Millspaugh and Clarence Irish, details of the plans of the company cannot be learned. It is presumed that the old main plant of Millspaugh & Irish will be discontinued and that the portion of the Cole plant, leased two years ago in its first expansion movement, will also be given up and the business concentrated in the old Mid-West plant.

This city is becoming increasingly active in body building. The Robbins Body Co. is under a heavy production schedule, and the local plant of the Murray Body Corp. making Marmon bodies has been in big production for months.

Pratt & Whitney Plant Doubles Production

HARTFORD, CONN., Feb. 21—Production schedules of the Pratt & Whitney Aircraft Co. are to be doubled according to an announcement made by officers of the organization this week. The company also announces the largest sale of its Wasp engines for commercial purposes. The Boeing Airplane Co. has placed an order for 25 of the 400 h. p. Wasp engines for installation in air mail planes. The amount represented by this contract including extra parts is about $250,000. The engines will be in the air by June 1.

The company now has a larger type engine which is expected to be in production in about four months. Ford Motor Company is engaged in experimental work with the Wasp engine.

Ships 55 Tractors Abroad

MINNEAPOLIS, Feb. 19—January indications and orders on file show that the 1927 business volume of the Minneapolis Steel & Machinery Co. will approximate $10,000,000. Much of the prospective gain is in exports. In the last two months 25 tractors have been sent to Australia and 30 are being sent this month to Argentina. Report to the board of directors for 1926 shows gross sales of $7,800,000, a gain of 30 per cent over 1925. This is the largest volume since 1920. W. S. Peddie has been advanced to comptroller and assistant treasurer and S. L. Angle to auditor for the company.

MARYLAND TO VOTE ON MINIMUM SPEED

BALTIMORE, Feb. 23—A minimum speed on Maryland highways is provided in a bill that has been introduced in the Maryland Senate. Some time ago John N. Mackall, chairman and chief engineer of the Maryland State Roads Commission, advocated a minimum speed, taking the stand that the slow-moving vehicle is responsible for numerous accidents. The bill offered provides for a minimum speed of 20 miles per hour on Saturdays, Sundays and legal holidays, the days when traffic usually is heaviest. Under the provisions of the bill the speed law in cities and towns where the maximum is under 20 miles would not be changed.

Seek Additional Funds for U. S. Rubber Study

WASHINGTON, Feb. 21—President Coolidge has asked Congress for a $200,000 fund to permit the Department of Agriculture to enlarge its investigations of rubber production, especially in the Philippine Islands, it was announced here this week. The War Department has agreed to assign 6000 acres on the island of Mindanao for experimenting.

At the same time the Department of Commerce received from the chief of its rubber division, now in Europe, a prediction that French Indo-China rubber planters will seize upon the struggle between American rubber importers and Great Britain over the Stevenson Act as a means of increasing their rubber trade. He predicted that the rubber production of the colony would be increased from 10,000 to 100,000 tons a year within the next decade or two.

Selden Head Directs Kelly

ROCHESTER, Feb. 21—Rumors of a merger of the Selden Truck Corp. here and the Kelly-Springfield Truck & Bus Co. of Springfield, Ohio, are current here following the announcement that H. E. Zimmerman, president of the Selden company, has taken over the direction of the Ohio concern. H. V. Webber, of the Selden Truck Corp. made the announcement here, but denied there were any plans for consolidating the two companies at present.

Klaxon Adds New Horn

DETROIT, Feb. 16—A warning signal of the high-frequency type has been added to the line of the Klaxon Co. It will be known to the trade as Klaxon 11 and will sell to the consumer at $4 list and $5.25 in Canada. The signal measures 11⅝ in. long and is finished in glass baked enamel. It is available in either six or 12-volt types and was developed to meet the demand for horns operating on the high-frequency principle.

R. P. Page, Jr., New Autocar President

Directors Choose Sales Manager as New Head—Joined Company in 1912

ARDMORE, PA., Feb. 21—Robert P. Page, Jr., has been elected president of the Autocar Co., succeeding the late L. L. Woodward. Other officers elected are John S. Clarke, first vice-president; Walter T. Savoye, second vice-president; John C. Taney, treasurer, and R. T. Anthony, secretary.

Mr. Page had been general sales manager of the company since the middle part of 1926, being appointed to that position shortly after the election of Mr. Woodward as president. He had been a member of the Autocar sales organization since 1912, soon after being assigned to the Boston branch. There he arose to the position of branch manager and then to New England district manager. He made many friends in this territory which has long since been a leader in the use of Autocar products. His success there brought him to the post of general sales manager.

Mr. Page is in his early forties and comes to his new position well equipped with practical experience won by many years of direct contact with practically all phases of motor truck manufacturing and selling. He had long had an influential voice in the executive councils of the company and his elevation to the presidency is regarded as an excellent selection for the company.

The new board of directors of the company is composed of John S. Clarke, Walter W. Norton, Roscoe T. Anthony, John C. Taney, H. A. Smith, Herbert Sinclair, William W. Battles, Robert P. Page, Jr., and Charles S. Newhall.

Financial Position Improved

ARDMORE, PA., Feb. 22—A ratio of current assets to liabilities of 2.51 to 1 on Dec. 31, 1926, as against 2.28 to 1 in 1925 is shown by the balance sheet of the Autocar Co. This reveals the practical results of a policy, adopted early in the year, having for its purpose reduction of notes and accounts payable.

Total current liabilities at the close of last year were $2,367,524, a decrease of $815,564. Funded debt of the company shows a decrease of $217,750 during the year to a total of $2,033,750 which was made possible by the retirement of bonds and the cancellation of mortgages on the real estate sold. Surplus at the end of the year was $221,365.

Rubber Consumption Drops

NEW YORK, Feb. 19—Crude rubber used in the manufacture of tires, tubes and tire sundries in 1926 totaled 281,656 tons against 296,986 in 1925, the Rubber Association of America, Inc., reports.

Men of the Industry and What They Are Doing

J. S. Marvin Honored by National Traffic Group

Evidence of the close contact of the automobile industry with the railroads, waterways and steamship lines, was registered in the election of J. S. Marvin, chairman of the Traffic Managers Conference of the National Automobile Chamber of Commerce, to the presidency of the National Freight Traffic Golf Association, in New York. The annual meeting and luncheon was held aboard the Steamer Mauretania, the members being guests of the Cunard Line.

Traffic executives of railways, steamships, motor transport and the major industries to a total membership of nearly 600 have given the organization high standing in railway and shipping circles. Organized in 1905 this is one of the oldest of the many organizations now providing social facilities for men engaged in the same line of business.

The stated object is to encourage better acquaintance among freight traffic men, the meetings being largely attended by the members and their families.

Tweedy Joins Ajax

O. S. Tweedy has joined Ajax Rubber Co., Inc., as manager of branch sales. In announcing the connection, J. C. Weston, president of Ajax, said Mr. Tweedy would contact directly with the Ajax field organization, F. M. Hoblitt, vice-president, devoting his attention to the development of manufacturer sales. L. M. Van Riper continues as general sales manager.

Clay Heads Selden Sales

W. G. Clay has been appointed sales manager of Selden Truck Corp., succeeding to this position from the assistant sales manager chair which he has held for the past two years. During these two years Mr. Clay has centered his efforts in the territory made up of Pennsylvania, Maryland, New Jersey and West Virginia.

Dingley Goes Abroad

Bert Dingley, manager of the service department of the Stutz Motor Car Co. of America, Inc., is sailing for Europe March 4, where he will visit Stutz distributors in England and on the continent. As a leading American racing driver from 1904 to 1914, Mr. Dingley competed in the Gordon Bennett cup races in Europe and is well known there.

Myler Heads Traffic Club

James H. Myler, traffic director of the Chrysler Sales Corp., was elected president of the Traffic Club of Detroit at the February meeting of the board of directors. Mr. Myler succeeds Arthur T. Waterfall, vice-president of Dodge Brothers, Inc., in the Traffic Club chair.

COOLIDGE HEARS FIRESTONE PLANS

WASHINGTON, Feb. 23—Federal aid in his efforts to break the present international rubber monopoly through development of a 1,000,000 acre concession in the Liberian Republic, was discussed this week at an interview between President Coolidge and Harvey Firestone.

Mr. Firestone told the President that 100,000 lb. of crude rubber are shipped from his Liberian concession monthly and laid down in Akron at a gross cost of 14 cents a pound, as against 36 cents in the open market.

Samuels Heads Olds Branch

Olds Motor Works has established a branch at St. Louis, which will conduct a wholesale business only and will have in its territory the metropolitan territory of St. Louis, the southern section of Illinois and the eastern part of Missouri. R. L. Samuels, formerly assistant branch manager of the Minneapolis branch, has been appointed manager of the St. Louis branch. He was succeeded at the Minneapolis post by Ralph O. Hervey. Mr. Samuels has been affiliated with General Motors Corp. since 1918.

Wight Incorporates Company

Le Roy P. Wight has incorporated the advertising business of which he is head under the name Le Roy P. Wight, Inc. Associated with Mr. Wight are John B. Phillips and Sven Rasmussen. Mr. Wight was at one time advertising manager for Brown & Sharpe Mfg. Co. and later manager of the advertising and merchandising bureaus of the Class Journal Co., and vice-president of Myers, Beeson, Golden, Inc.

Butz Succeeds Taylor

Frank N. Butz has been appointed Detroit representative of the Hancock Mfg. Co., succeeding Forrest E. Taylor, resigned. Mr. Butz has moved the Detroit office from the Kresge Building to the General Motors Building.

Splitdorf Promotes Officers

Fred P. Upton has been appointed vice-president in charge of engineering and inspection of the Splitdorf-Bethlehem Electrical Co. and George Lang has been appointed vice-president in charge of engineering and inspection.

Warner Advertising Head

George Warner has been appointed advertising manager of Stevens Walden-Worcester Co., and is now engaged on plans for an active campaign to promote the sale of products of the recently combined companies.

Chandler Adds Four Men to Traveling Field Staff

Chandler-Cleveland Motors Corp. has added four men to its traveling field staff. Phillip Simmons, formerly vice-president of the Florida-Chandler Motor Co., will cover the state of Alabama; E. H. Hyland, formerly with Studebaker in Omaha, will travel Nebraska and South Dakota; J. Ford Kelly, formerly service manager for Federal truck in Detroit, and also connected in the past with Paige-Ohio, Rickenbacker and Rollin, will cover Kentucky and West Virginia, and G. F. Horn, formerly wholesale manager for Roy C. Bothwell, Chandler distributor at Salt Lake City, will cover Utah and Idaho.

Cook Visits Factory

W. E. Cook, service engineer of Societe Anonyme Francaise North East of Paris, is in Rochester to prepare himself for the part he is to take in the European distribution and servicing of the new North East powered Remington electric typewriter. He is spending a month at the North East factory here familiarizing himself with all details of the new product.

Rhein Joins Marmon

L. R. Rhein has been appointed body engineer of Marmon Motor Car Co. For some years past Mr. Rhein has been body engineer for the Lincoln division of Ford Motor Co. and previously was with the Fisher and Wilson body companies.

Johnson Leaves Salisbury

J. Fulton Johnson has resigned as purchasing agent of the Salisbury Axle Co., effective March 1. Mr. Johnson previously to joining the Salisbury company on its reorganization by the C. A. Dana interests seven years ago, was purchasing agent of Paige-Detroit Motor Car Co.

Bickel Joins Yost Company

W. A. Bickel, who for the last five years has been supervisor of sales for the Automotive Maintenance Machinery Co., has been appointed sales manager of the Yost Mfg. Co. of Meadville, Pa. The Yost company manufactures vises and small gas furnaces for the automotive trade.

McKee Now in Cleveland

John McKee, Jr., who has been branch manager for the Mason Tire & Rubber Co. at Dallas, Texas, has been made branch manager at Cleveland. He was formerly with Goodyear and Seiberling.

A.S.M.E. Meeting May 23

NEW YORK, Feb. 7—The American Society of Mechanical Engineers will hold its spring meeting at White Sulphur Springs, W. Va., May 23 to 26.

Industry Holds Steel Buying Pace

Most Orders Reported to Meet Current Demand—Some Specialties Gain

NEW YORK, Feb. 24—Speaking of the steel industry as a whole, it is thought that more steel is being made than shipped, and that new orders are coming in at a rate slightly below that at which old orders are being shipped. Virtually all automotive demand, however, is of the current sort. Orders that came in previous to Tuesday's holiday were largely for first and second half March shipment, although, in some instances, automotive consumers have in part anticipated their requirements for the year's second quarter.

While figures are not available, it is sensed in the trade that automotive consumers are placing orders at least at a rate that fully makes up for the dent made in backlogs by shipments, and in some automotive specialties fresh business has shown an increase from week to week this month. In fact, some finishing mills have accumulated sufficient of an order reserve at low prices that they are now far more on the alert for opportunities that will permit them to "sweeten" average sales prices than for mere tonnage additions.

While the market can not be characterized as weaker, it certainly has not turned stronger. Hot-rolled steel bars now carry a maximum price of 1.90 cents, Pittsburgh or Cleveland, the 2-cent figure having disappeared, and some buyers claim that they would have no trouble in contracting for worth-while tonnages at as low as 1.80 cents. Automotive demand for strip steel has broadened, and, on the whole, both the hot-rolled as well as cold-rolled are a shade more steady. In black sheets, competition is as keen as ever. Concessions of $2 to $3 a ton from the commonly quoted market prices are not unusual in the case of large Detroit buyers.

Full-finished automobile sheets continue firm at 4.15 cents, Pittsburgh. Cold-finished steel bars are in steadily expanding demand. Consumers not covered by more favorable contracts buy on a 2.40 cent, Pittsburgh, basis. Further betterment is noted in the demand for automotive alloy steels. Not only is the number of individual orders increasing, but some of the larger consumers appear somewhat more disposed to order fair-sized tonnages.

Pig Iron—Demand from automotive foundries is fairly good. Market prices hold unchanged, but blast furnace sales agencies show somewhat more reserve when business at concessions from the regular market is proffered.

Aluminum—Mail advices from Berlin disclose a new development that may have far-reaching result. Germany, heretofore to a considerable extent dependent upon France and Italy for its supply of bauxite from which aluminum is obtained by reduction, has been able to obtain heavy bauxite supplies from southern Hungary and closed arrangements with the Hungarians that will assure for this year a supply displacing two-thirds of the imports from France and Italy. Given a more abundant supply of raw material, Germany is very likely to figure more prominently as an exporter of aluminum than is now the case. Market conditions in all respects unchanged.

Copper—Stocks of refined copper are the heaviest since March of last year. Export business is lagging, and the only factor making for somewhat less demoralized conditions is that first hands are not forcing their holdings for sale. Very slow improvement is noted in domestic demand.

Tin—Relatively light shipments from the Straits this month are a prop for continuing bull maneuvers.

Lead—Storage battery manufacturers hold still aloof from the market. Another large producer has curtailed output. The undertone of the market is strong, but there is some doubt as to whether advances could be maintained very long.

Reports Duralumin Sales Doubling Former Volume

SPRINGFIELD, MASS., Feb. 21—Sales of duralumin since the beginning of this year have been in double the volume recorded for the corresponding period of any previous year and this ratio promises to be maintained for the rest of the first quarter, according to H. O. Shepard, manager of the metal division of the Baush Machine Tool Co., sole American licensee for its manufacture. The biggest gain in volume has been in sales to the automotive industry.

A special item contributing to the gain is the increased use of this metal for outside and inside trim of automobile bodies. Another is the increased use of duralumin rims locking the tire to the wheel. The airplane industry is constantly increasing its use of duralumin.

Valentine Offers Service

NEW YORK, Feb. 21—Valentine & Co., has announced the introduction of a new color advisory service for automotive manufacturers based upon its recent developments in color schemes taken from precious and semi-precious stones which were exhibited, for the first time, during the New York show and later in Chicago during show week there.

Push Flint Fisher Plant

DETROIT, Feb. 21—Fisher's new body plant at Flint is rapidly getting into production on Buick closed bodies; 1800 men are now employed, turning out 250 bodies daily and 25 new dry kilns will be in operation March 1, when work of setting machinery in the new mill will be started. The new power plant will also be ready then.

German Imports Decline in Value

Decrease From 1925 Total of 68,220,000 Marks to 52,300,000 Marks

BERLIN, Feb. 12 (*by mail*)—In 1926 value of imports of automobiles, motorcycles, and commercial cars into Germany amounted to 52,300,000 marks as against 68,220,000 in 1925 and 37,900,000 in 1924. The exports in 1926 amounted in value to 33,410,000 marks as against 36,940,000 in 1925 and 27,230,000 in 1924. Of the imports, 83 per cent consisted of passenger cars, 7.5 per cent of commercial cars, and 7.6 per cent of motorcycles. Most of the passenger cars came from the United States and Italy, and nearly all commercial cars—1613 out of a total of 1744—also came from the United States.

The principal customers for German passenger cars were, in order of importance, British South Africa, Austria, Denmark, Holland, Russia, Switzerland, Czechoslovakia, Yugoslavia, Spain, Malatta, Hungary, Japan, Rumania, Italy and Turkey. Commercial cars were also shipped to Russia, Holland, Brazil and Persia. The average price for an imported passenger cars was 4478 marks (5922 in the preceding year) and for an exported passenger car 6768 marks as against 8909 in 1925. As to commercial cars, the average price for an imported car was 2259 marks against 3302 in 1925 and for an exported commercial car 11,346 marks against 12,558 in 1925. The average price for imported motorcycles was 1029 marks against 1032 in 1925 and for exported motorcycles 890 marks against 896 marks in 1925.

A.E.A. Prints Catalog in Three Languages

CHICAGO, Feb. 19—The Automotive Equipment Association announces that its catalog department has in the process of compilation a new universal catalog which will contain approximately 700 pages of text and illustrations describing the automotive products manufactured by its members. This book, which will be known as Universal Catalog D, will be the fourth catalog issued by the A. E. A. It will be published in three language editions, English, French and Spanish.

Rumania Best Balkan Market

LONDON, Feb. 15 (*by mail*)—Although Rumania is stressed financially, it imported about 5000 automobiles in 1926. This total exceeds the aggregated imports of the remaining Balkan countries. About 70 per cent of Rumania's automotive imports came from the United States, 20 per cent from Italy, and the bulk of the remainder from France.

Ford Sales Drop 50% in Wisconsin

January Figures Show Business Gains for Other Makers Over 1926 Total

MILWAUKEE, Feb. 19—A gratifying state of affairs with respect to passenger car business in Wisconsin and Milwaukee is revealed by official figures just issued by the secretary of state. These show that in January, new car sales numbered 4271, compared with 4764 in the same month a year ago. While this indicates a decrease of 493 cars, there actually is a gain of this number if Ford sales are discounted. Ford sales in January, 1926, were 2093, while this year sales were 1071, a decline of 1022. Chevrolet sales increased from 571 to 1011.

Milwaukee county sales in January numbered 1252 against 1265 a year ago. Ford sales declined from 421 to 221, Chevrolet sales increasing from 113 to 261.

Ford Drops in Indiana

INDIANAPOLIS, Feb. 19—New car sales in Indiana during January took a sharp spurt ahead, according to registration figures compiled by the Indianapolis Auto Trade Association. Comparative totals show that the figures for the first month of the present year exceeded that of January, 1926, by 40 per cent and December, 1926, by 109 per cent. Ford, as usual, accounted for the greatest volume, this make scoring 38 per cent of the total for the state. This proportion, however, is considerably smaller than the 48 per cent for Ford in January, 1926. Chevrolet, next to Ford in this standing had 19 per cent of the state's total in January, 1927, against 12 per cent in January, 1926. Practically all makes shared in the improved business for the month. The total new car registrations for the month were 8136 against 3883 in December, 1926, and 5816 in January, 1926.

Carolinas Show Gains

RALEIGH, N. C., Feb. 22—New car sales showed a gain of 1 per cent in North Carolina, and one-half of 1 per cent in South Carolina for the year 1926 over 1925, according to comparative figures announced by C. W. Roberts, vice-president of the Carolina Motor Club. North Carolina 1926 sales totalled 65,285, a gain of 789 cars over the 1925 total of 64,496. South Carolina figures for the year 1926 were 27,194, compared with 27,053 for the previous year, a gain of 141 cars.

Heavy declines in Ford sales and big increase in the Chevrolet demand featured the reports from both states. North Carolina Ford sales last year were 34,061, a decrease of 8413 from 1925. In South Carolina the 1926 total was 15,390, compared with 18,524 in 1925.

North Carolina Chevrolet sales for 1926 were 10,884, a gain of 5100 over the previous year. South Carolina Chevrolet sales for 1926 were 4835, compared with 1962 in 1925.

Combined Oakland and Pontiac sales of 851 cars, a gain of 664, or 455 per cent, represented the greatest percentage of increase for the year.

Maryland Sales Gain in 1926

BALTIMORE, MD., Feb. 21—An increase of 6232 new passenger and commercial car sales took place in Maryland during 1926 as compared with the previous year. These statistics have been compiled by the Baltimore Automobile Trade Association, Inc., from monthly records kept by that organization.

During the last year the association records sales of 41,610 passenger cars, 5623 trucks and buses, and 176 tractors. In 1925 the records showed sales of 35,878 passenger cars and 5296 trucks. No record of tractor sales was kept that year.

FWD Reports Increase of 57 Per Cent Over 1925

CLINTONVILLE, WIS., Feb. 19—Sales of FWD trucks in 1926 showed an increase of 57 per cent over 1925, according to reports presented to the stockholders of the Four Wheel Drive Auto Co. at the annual meeting. Owing to reductions in factory cost as well as selling cost, a substantial profit was carried over to the surplus fund, which now totals $1,102,000. In addition, the usual 6 per cent semi-annual dividend on common stock was authorized. There are no bonds, preferred stock or other indebtedness. During the past year the FWD truck has gained entrance into many new fields of activity, it was reported. Sales of earthboring equipment with trucks, snow removal equipment, fire trucks, road builder units and commercial trucks were made in virtually every state and in many foreign countries.

The seventh annual meeting of stockholders of the Menominee Motor Truck Co. was held immediately following the FWD meeting. A gratifying increase in sales was reported, particularly with respect to the Hurryton bus and Menominee road builder.

Auburn on 100 Daily

AUBURN, IND., Feb. 21—Production of Auburn Automobile Co. is now operating on a basis of approximately 100 cars daily, the February schedule calling for 2000 cars. This will be the largest production month the company has had with an increase of about one-third over any former month.

Marmon Adds 200 Dealers

INDIANAPOLIS, Feb. 19—Marmon Motor Car Co. announces since Jan. 1 it has added about 200 new dealers and distributors. The introduction of the new Little Marmon brought this increase.

Financial Notes

McCord Radiator & Mfg. Co., for year ended Dec. 31, 1926, shows net income of $723,041 after interest, depreciation, Federal taxes, reserve for contingencies, etc. If applied directly to the Class A common stock above earnings are equal to $18.84 a share earned on outstanding 38,250 no par shares of stock. This compares with $750,617, or $16.04 a share on 40,555 no par shares of Class A outstanding in 1925. Company has outstanding 38,250 no par shares of Class B stock.

Kelly-Springfield Tire Co., for the year ended Dec. 31, 1926, shows net loss of $3,439,799 after interest, depreciation, amortization, etc., and after crediting the account with $1,000,000 reserve previously provided for fluctuation of crude rubber prices. This compares with net profit of $1,452,577, equal to $2.34 a share (par $25) earned on common stock after allowing for the regular annual dividend requirements on the 6 per cent and 8 per cent preferred stocks in 1925.

J. I. Case Threshing Machine Co. declared a dividend of $1.50 on common, the first distribution on the junior shares in seven years, and regular quarterly 1¾ per cent on the preferred. Both dividends are payable April 1 to stock of record March 14. The report for 1926 shows net profit of $3,517,429 after depreciation, Federal taxes and reserve contingencies. This is equivalent after 7 per cent preferred dividends to $20.06 a share on $13,000,000 common stock, comparing with $2,293,673, or $10.64 a share, on common in 1925.

Emerson-Brantingham Corp. showed a deficit of $297,748 for the year ending Oct. 31, 1926, which was reduced to $145,474 after adjustment of an income tax refund. The deficit in 1925 was $915,914. In the reorganization all indebtedness, except current, was changed from bills payable to five-year debenture notes so that the present financial condition is more satisfactory.

Motor Wheel Corp. reports for year ended Dec. 31, 1926, net income of $1,625,051 after depreciation, Federal taxes, etc., equivalent after 8 per cent preferred dividends to $2.81 a share earned on 550,000 shares of no par common stock. This compares with $2,502,027, or $4.32 a share in 1925. Profit and loss surplus was $6,153,277 against $5,778,918 on Dec. 31, 1925.

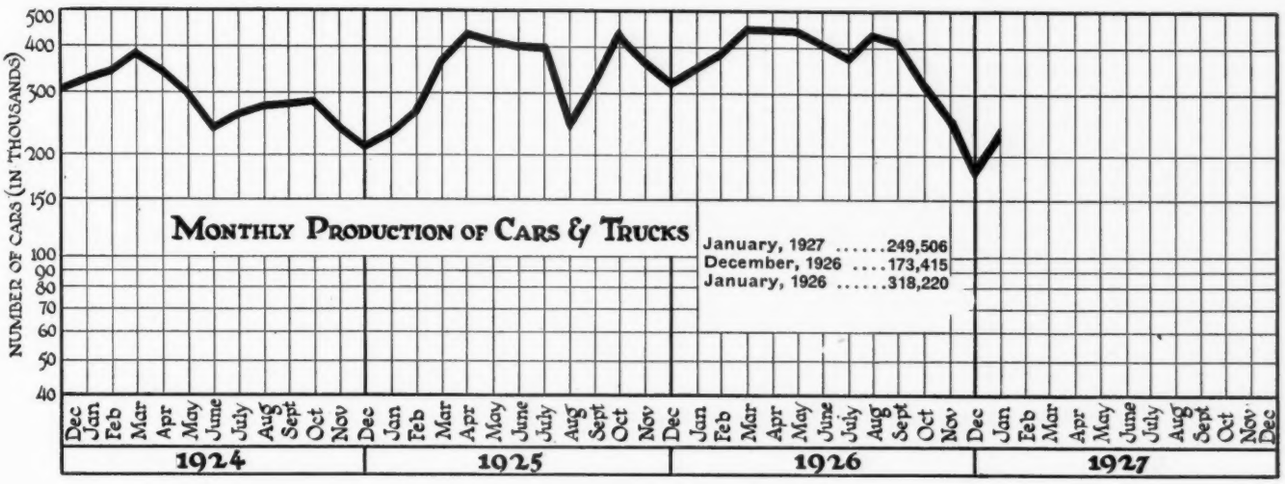
Shaler Co. stock has been admitted to the list of the Chicago Stock Exchange. 50,000 shares of Class "A" stock of no par value being listed. The Shaler company, a Delaware corporation, is the successor of the C. A. Shaler Co., of Waupun, Wis.

Yellow Truck & Coach Mfg. Co. omitted the quarterly dividend of 18¾ cents on the Class B stock due at this time. The regular quarterly dividend of $1.75 in the preferred was declared, payable April 1 to stock of record March 15.

Dunlap Tire & Rubber Co., Ltd., report shows redemption of bond issue of $600,000, dated March, 1912.

Briggs Mfg. Co. reports net income for 1926 as $8,178,512, equal to $4.08 a share, against $8,141,656, or $4.07 a share in 1925.

January Production Shows Sharp Increase



W. M. Lewis Dies, Built Mitchell Car

MILWAUKEE, Feb. 19—Lieut.-Col. William Mitchell Lewis, of Racine, for many years a manufacturer of bicycles and later of automobiles, died Feb. 14 at his winter home in Daytona Beach, Fla., after an illness of nearly two years which is believed to have been the result of his service in the World War. Colonel Lewis was 58 years old and a native of Racine. His father, the late William Turnor Lewis, was a pioneer wagon manufacturer and member of the old Mitchell & Lewis Co., out of which grew the Mitchell-Lewis Motor Car Co.

Colonel Lewis and members of his family disposed of their holdings in 1919 to the Mitchell Motor Car Co., a new concern financed with eastern capital, which became defunct in 1923. Later the buildings and acreage were purchased by Charles W. Nash and the plant is now devoted to the manufacture of Nash light six.

Colonel Lewis was graduated from Yale University in 1891. He was famous as center rush of the Yale football teams of 1889-1891. In 1898 he was commissioned captain in the United States Volunteers and participated in the Spanish-American War. At the outbreak of the World War he was commissioned a major and went overseas in January, 1918. When he returned in 1919 it was as a lieutenant-colonel, he having been promoted on the field.

In 1910 Colonel Lewis was a candidate for the Republican nomination for governor of Wisconsin.

Lovejoy Adds Plant Unit

BOSTON, Feb. 19 — The Lovejoy Mfg. Co., maker of shock absorbers, has taken additional space near its present plant to meet increased orders. New orders received since Jan. 1 total more than 25,000 sets, some of these being due to the Lovejoy being standard equipment on a larger number of standard production cars. Its retail orders are increasing.

Tyler Resignation Brings Ford Buffalo Zone Change

BUFFALO, Feb. 19—George B. Tyler, district manager of the Ford Motor Co. and head of the company's plant here, has announced his resignation. Mr. Tyler's retirement from active business life, due to ill health, was advised by his physician following a recent breakdown and becomes effective at once. M. H. Braun, formerly of the Detroit district, has been named as Mr. Tyler's successor.

Mr. Tyler has been connected with the Ford Motor Co. 16 years, and since 1917 has been manager of the Buffalo district which, until now, comprised practically the entire state (with the exception of New York City), northern Pennsylvania and part of Vermont. With the announcement of Mr. Tyler's resignation, notice has been issued from the main office of the company in Detroit that the Buffalo district had been divided and a new district, with headquarters at Green Island, Albany County, had been established.

Ford Gets Greek Grant

PHILADELPHIA, Feb. 21 — The Ford Motor Co. is about to open an assembling plant and repository in Piraeus, Greece. Parts imported from the United States will be assembled into complete vehicles at this plant and from there distributed to all parts of the Orient. In its arrangement with the Greek Government the company has agreed to give preference to Greek vessels for ocean transport.

Moto Meter Plug Ready

LONG ISLAND CITY, N. Y., Feb. 19—The Moto Meter Co., Inc., reports the new Moto Meter spark plug with self-adjusting spark gap, is now ready for distribution through the trade.

G.M. Retail Sales 81,010 in January

DETROIT, Feb. 21—Final report on retail sales of General Motors Corp. cars in January shows a total of 81,010, compared with 53,698 in January, 1926, and 25,593 in 1925, according to Alfred P. Sloan, Jr., president. Division sales to dealers were 99,367.

While General Motor's 18,000 dealers enjoyed a 50.9 per cent increase in business over January a year ago, Mr. Sloan said the general trend of sales has not been materially altered, the increase being accounted for by the improved position of Chevrolet and on account of the Pontiac which, from the standpoint of retail sales, was not a factor a year ago.

Comparative sales by dealers to ultimate consumers and by the manufacturing divisions of General Motors to dealers follow:

DEALER SALES TO USERS

	1927	1926	1925
Jan.	81,010	53,698	25,593
Feb.	.....	64,971	39,579
Mar.	.....	106,051	70,594

DIVISION SALES TO DEALERS

	1927	1926	1925
Jan	99,367	76,332	30,642
Feb.	.....	91,313	49,146
Mar.	.....	113,341	75,527

Chevrolet Truck Output Increases 132% in 1926

DETROIT, Feb. 19—In producing 112,499 commercial vehicles in 1926, an increase of 132 per cent over the preceding year, the Chevrolet Motor Co. lays claim to being the largest producer of gear shift trucks. The increase represents a gain of 64,200 over the 1925 output which totaled 48,299. Chevrolet's 1924 output of commercial cars was 23,134.

Present manufacturing schedules call for a still larger number of trucks than were made last year. Truck production for January was 15,927.

$29,000,000 Refund Awaits Consumers

WASHINGTON, Feb. 23—After six weeks of disagreement Congress today passed the urgency deficiency bill, carrying with it a sum of $29,000,000 to refund manufacturers for illegally collected automobile excise taxes on accessories and parts. The measure, however, as passed, contained the House rider which forces manufacturers to post a bond of twice the amount repaid to it by the Government, conditioned upon the amount so paid being ultimately repaid to the consumer.

The effect of the House amendment will be to nullify the rebate of the illegally collected taxes and it is doubtful if 5 per cent of the amount voted to be returned will be repaid, because of the impossibility of accessory manufacturers to trace back the tax through the jobber, wholesaler and retailer to the consumer who paid the tax. Representatives of the accessory manufacturers, who have been in Washington in the interest of the measure, declare that with the House's rider amendment it is doubtful if the manufacturers will even make application for the refund.

Gisholt Opens Office

CHICAGO, Feb. 21—An office has been opened here by Gisholt Machine Co. at 722 West Washington Blvd., in charge of R. E. MacCartney, who has been special factory representative in the Chicago district for the past year. Mr. MacCartney will be assisted by E. B. Verner, who has been connected with the home office for the past several years.

Coast Salon a Success

LOS ANGELES, Feb. 21—Exhibitors at the Los Angeles automobile salon which has just concluded after a week's display of American and foreign custom-built cars at the Biltmore Hotel, report an excellent response in the way of actual buyers. The show was well attended and highly successful.

PAIGE 8 PRICES RANGE $2295-$2795

DETROIT, Feb. 21—The Paige-Detroit Motor Car Co. will enter production on its new eight-cylinder car in March. The car was shown in advance at the various automobile shows and received an enthusiastic reception, according to Paige executives, who state that the full facilities of the factory will be devoted to catching up with orders already on hand.

Prices on the eight-cylinder line are 7-passenger touring $2295, 4-passenger cabriolet roadster $2655, 4-passenger coupe, $2655, 7-passenger sedan $2655, and limousine $2795,

White Western Offices Moved to Kansas City

CLEVELAND, Feb. 21—Headquarters of the western region of the White Co. sales and service organization have been moved from St. Louis to Kansas City. Offices were opened in the New York Life Building by Vice-President Newell Lyon and E. W. Stock, regional service manager. Kansas City will be one of seven headquarters for White sales and service regions, the others being in New York, Boston, Chicago, Cleveland, Atlanta and San Francisco.

Federal Net $1,222,850

NEW YORK, Feb. 23—The Federal Motor Truck Co. net earnings in 1926 were $1,222,850, after taxes and charges, against $1,234,799 in 1925, equal respectively to $2.98 a share on 410,000 shares of no par capital stock against $6.17 on 200,000 shares of $10 par stock outstanding in 1925. President M. L. Pulcher pointed out that in 1926 the manufacturing plant was rearranged to provide for progressive line assembly of chassis. All the expense was charged off to 1926 earnings.

Los Angeles to Get New Willys Plant

LOS ANGELES, Feb. 21—Definite announcement was made by John N. Willys, president of Willys-Overland Co., at a luncheon tendered in his honor at the Hotel Biltmore by Los Angeles bankers, that this city has been selected as the site for the new $1,500,000 western assembling plant of his company, from which the Pacific trade territory will be supplied. Mr. Willys has been investigating possible sites in various Pacific Coast cities for several weeks and he determined upon Los Angeles because the largest percentage of automobile sales on the coast are in or immediately adjacent to southern California.

While speaking at the luncheon Mr. Willys said that in his belief the present prevailing plan of instalment buying of automobiles was sound, and that it enabled more and more persons to acquire the better grades of cars.

Work on the new Willys plant in Los Angeles is expected to start in the next few months.

Parts Export Increase

WASHINGTON, Feb. 21—Exports of parts in 1926 increased to $36,064,524 from $29,213,307 in 1925 according to figures issued by the Department of Commerce. Accessory exports increased to $9,279,096 from $8,611,000 and service appliance exports increased to $6,-861,746 from $5,432,711.

Eaton Net Income $962,054

NEW YORK, Feb. 23—Eaton Axle & Spring Co. reports net income for 1926 as $962,054, equal to $3.85 a share earned on 250,000 outstanding shares against $760,774, or $2.83, in 1925.

New Jersey Sales Lower

NEW YORK, Feb. 23—January sales of passenger cars in New Jersey totaled 6650 against 8373 in January, 1926, according to Sherlock & Arnold figures.

Calendar of Coming Events

SHOWS

Barcelona .....April 27-May 8
Boston .....March 5-12
Mechanics' Bldg., including special Shop Equipment Exhibit.
Budapest .....June 4-15
Cairo .....Feb. 15-March 15
First International Motor Show.
Cleveland .....Sept. 19-23
Exposition, Public Auditorium, National Machine Tool Builders' Ass'n.
Cleveland .....Oct. 3-7
Exhibition, Public Auditorium, American Electric Railway Ass'n.
Cologne .....May 20-31
International Commercial Transport Exhibition.
Geneva .....March 4-13
Palais des Expositions.
London .....Oct. 14-22
Olympia Passenger Car Show.
London .....Nov. 17-26
Olympia Truck Show.
New Haven, Conn. .....Sept. 6-9
Machine Tool Exhibition.
Paris .....Oct. 6-16
Grand Palais.
Riga .....April 10-17

CONVENTIONS

American Electric Railway Association, Public Auditorium, Cleveland ..Oct. 3-7
American Welding Society, Engineering Societies Bldg., New York City .....April 27-29
Automotive Equipment Association Summer Convention, Multnomah Hotel, Portland, Ore. ...June 27-July 2
National Association of Automobile Show and Association Managers, Drake Hotel, Chicago .....July 26-27
National Battery Manufacturers Association, Benjamin Franklin Hotel, Philadelphia .....March 10-11
National Foreign Trade Council, Detroit .....May 25-27
National Safety Council, Stevens Hotel, Chicago .....Sept. 26-30

S. A. E.

Dayton, March 1—Dinner and meeting jointly with Engineers' Club—J. H. Hunt, speaker.
French Lick Springs, Ind., May 25-28—Summer Meeting.

RACES

Abilene, Texas .....July 4
Altoona, Pa. .....June 11
Altoona, Pa. .....Sept. 5
Atlantic City .....April 30
Atlantic City .....Sept. 24
Charlotte, N. C. .....May 9
Charlotte, N. C. .....Nov. 11
Detroit .....Sept. 10
Fresno, Cal. .....April 21
Indianapolis .....May 30
Los Angeles .....April 10
Los Angeles .....Nov. 27
Salem, N. H. .....June 25
Salem, N. H. .....Oct. 12
Syracuse, N. Y. .....Aug. 27